Products finishing

FRED W. VOGEL, Editor

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Products Finishing

AMERICA must face the fact that it can win the war only if it provides a greatly expanded production of military goods during the rest of 1942, Chairman Donald M. Nelson of the War Production Board told a conference of business editors and publishers recently.

"Every weapon we make today is worth 10 that we might produce next year," Mr. Nelson said. "This year—1942—is the critical year in the existence of the United States. I'm not painting the picture darkly, but I do believe that we who know what American industry can do must look at the situation squarely and see what we can do to make up for lost time.

"We've lost a lot of time because industry was fearful of what might happen after the war if all our productive facilities were over-expanded. Let's stop thinking about what we'll do when it's all over and start thinking about what we're going to do now to prevent it from being all over for us.

"We've wasted the golden months in which we could have got fully ready—the months in which we could have expanded our steel industry, our chemical industry, our copper industry, and all the others, so that we would have plenty of everything. But we still have ten silver months—the months which remain in 1942—and in them we can still do things that we never thought possible. The speed, energy, will and determination which we put into those months will determine what we'll think when those months are gone."

Getting maximum production at once, Mr. Nelson said, depends on these things:

1. **Getting greater production out of the plants and machines which are now producing war goods. Even though the country today is producing a much greater volume of armaments than in 1918, he said, the present volume is not nearly so great as it must become.**
2. **Getting military production out of factories and machines which are now producing civilian goods—in other words, by conversion of industry to full war production.**
3. **Enlisting the services of small producers, through sub-contracting and through the letting of prime contracts to groups of small manufacturers who have pooled their facilities.**

"There isn't a single big producer who can't do more than he is doing now if he subcontracts part of the job," said Mr. Nelson. "Industry itself must find the way to do that job. It must not make the mistake of relying on government to do it, because we in Washington can't possibly do more than part of it. Industry has been lazy on this whole subject, because the job has looked pretty difficult. The day for that sort of laziness has passed.

"Industry's responsibility is great, in all of this. The job will take brains and initiative; but we can do it if we go out with a will, if we stop thinking about what we're going to do to the enemy in 1943 and start thinking about what we're going to do to him in March of 1942.

"This country today faces the most gigantic job any country has faced in all history. We must build a great armament program; we must make up, in less than two years, what the aggressor nations have done in ten years; we must make TODAY the things we would be making next year if we had the time to spare.

"Of course we face many problems, obstacles and difficulties. We can and will solve them, if we face the job coolly and deliberately and with determination."

Keeping Highway Freight Equipment Looking Spick and Span

First Class Maintenance of Highway Freight Hauling Equipment Is of Utmost Importance During War Time

By HARRY F. CHADDICK
President, American Transportation Co., Inc.

TO the motor freight carrier a fleet of well-kept, good-looking units is what an attractive window display is to the merchant. This is the opinion of the American Transportation Co., Inc., and its associated lines—Bates Motor Transport Lines and the Standard Freight Lines, the three operating as one system with headquarters in Chicago, and terminals in Wisconsin, Illinois, Indiana, Ohio, Michigan, Kentucky, and Missouri. Realizing the advertising and good-will value of attractively painted and lettered motor vehicles that are kept clean, the American Transportation Co. operates its own maintenance painting department as a part of the body repair shop activities, thus keeping its units always looking like new. Before any unit is permitted to go out on a trip, it is given a thorough washing with soap compound and water in the company's large

Fig. 1 — The trailer body is sanded completely preparatory to repainting.

Fig. 2 — Illustration showing workmen applying a primer coating over the sanded surface.

•

wash room, which accommodates two tractor-trailers, and which is constantly in use. The repainting of each unit is also carried out systematically.

On the average of once a year, each unit passes through the paint shop for a complete repainting. In cases of accident, however, the repairs are made immediately upon the return of the unit, and the repainting done at this time. In the annual painting the old paint is not entirely removed, except in places where it is chipped or scratched. In such places the old coating is entirely removed, all dents pounded out, and scratches and bad places filled in with a melted lead spray, then sanded smooth with disc sander. After this the entire surface is roughened by sanding, which is followed by a prime coat of red oxide over the entire surface and allowed to dry for about four hours.

•

A color coat of synthetic enamel is next applied and left to dry overnight. Except for lettering, the color combination of all units is the same —the upper part of the body of the straight trucks and trailers is cream, while the lower portion is green, the two colors being separated by a 6-in. strip of black. The same color scheme is carried out on the tractors, with the upper portion of the cab cream and the balance of the body and

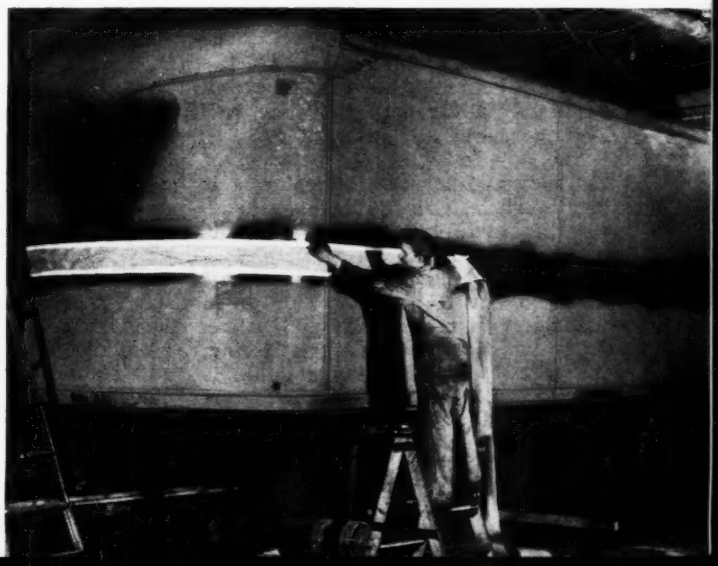

Fig. 3—Masking tape is applied to the side preparatory to painting on a six-inch black belt line.

fenders green, the two colors separated by a 3-in. strip of black. In applying the color coats to the body, the black strip is the first to be sprayed on. When this is dry, it is masked and the cream is applied, followed immediately by the green on the lower portion. In this way only one masking is necessary for the entire spray painting procedure. On the tractors the wheels are painted green, while on the trailers they are red. The chassis of all units are red.

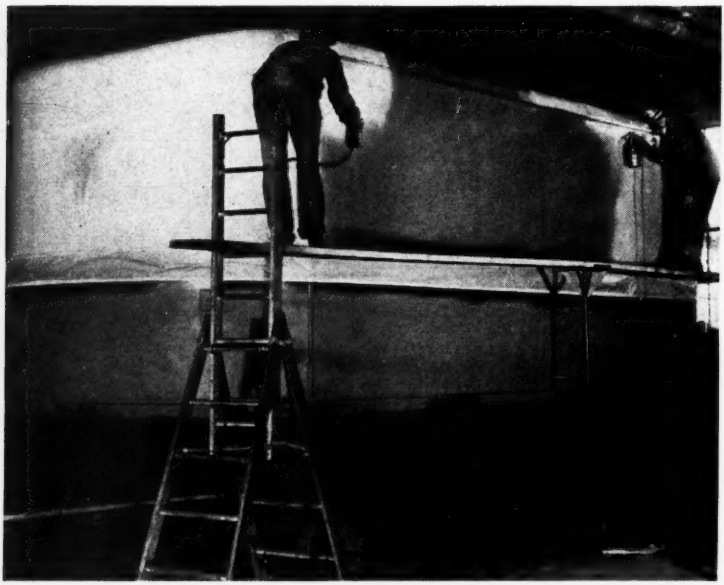

Fig. 4—Spray painting the color coating.

The day following the painting of the body and chassis, the lettering is done. All lettering is done by hand. On the tractors it is gold leaf outlined with red; on the trailers it is blue on the cream portion of the unit with no outline, and on the green portion it is silver with no outline. After the completion of the lettering, the entire unit, lettering and all, is sprayed with a coat of synthetic varnish. It has been found that a good coat of varnish not only serves to give a high gloss, but also that it protects the color coat to such an extent that many times, when a unit after some months of hard road work looks untidy, it can be perked up and made to look spick and span like new after a thorough washing and a new coating and a new coat of varnish.

The lettering is the only distinguishing feature of the individual companies. On the front of every truck and trailer is the company's emblem in the form of a triangle, inside of which appears the name of the individual company, one of the three making up the American Transportation organization, in aluminum letters outlined in red on a green field. Cup spray guns are used exclusively for all spray painting, with an air pressure of 55 to 60 pounds.

The paint shop is located within a block of the company's freight terminal building recently constructed on Chicago's West Side, which incorporates all modern structural improvements and handling equipment, where more than 1,000,000 pounds of less - than - truck - load freight is handled daily. In the well-lighted paint shop some thirty straight trucks and tractor-trailers are put through each month. The three companies combined operate approximately 300

ARE YOU using—or planning to use—the old-fashioned "rack and tank" method of shell washing? Such a method is slow, messy, time consuming, wasteful of materials.

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units consisting of tractor-trailers and straight trucks—all metal units. Of these 15 are stainless steel trailers, of the balance 20 are open top trailers, steel panel bodies with tarpaulin roof; 20 are semi-open trailers with steel panel and ⅓ steel roof and 2/3 tarpaulin; while the remainder are of the van type and refrigerator bodies, all being of steel panel construction.

On the stainless steel units, large letters—cut from Masonite—are affixed and painted, following the same practice as with the painted units. The entire fleet covers more than 10,000,000 miles a year.

Fig. 5—Lettering is applied to the completely repainted trailer body.

Hanson-Van Winkle-Munning Plating Specification Booklet. The Hanson-Van Winkle-Munning Co., Matawan, N. J., manufacturer of electroplating equipment and supplies, has issued a new edition of a booklet which includes specifications for electrodeposited coatings of zinc, cadmium and nickel on steel; nickel and chromium on copper and copper base alloys; nickel and chromium on zinc and zinc base alloys; also methods of testing for local thickness of electrodeposited coatings. These are the tentative specifications of the American Society for Testing Materials, prepared jointly by the American Electroplaters' Society, the National Bureau of Standards, and the American Society for Testing Materials.

The booklet is neatly bound between two stiff paper covers to keep in good repair a collection of data which is invaluable to every producer of electroplated metal products. Copy free upon request.

Durcopumps. Bulletin No. 810 illustrating and describing in detail, with complete dimensions for all sizes, a series of pumps manufactured by The Duriron Company, Inc., 450 N. Findlay St., Dayton, Ohio, is now being issued by the company.

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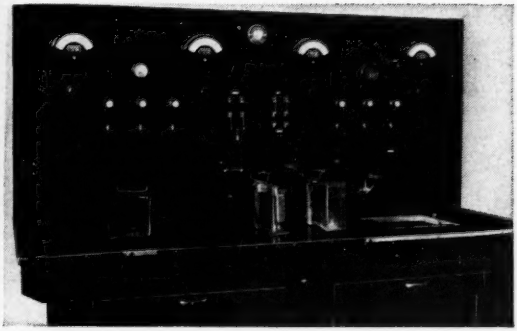

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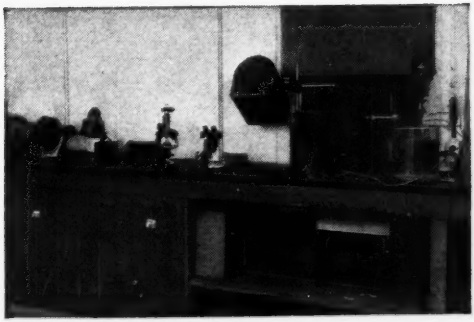

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Moving Cathodes In Electroplating Solutions

By H. B. GEORGE

THE object of a moving cathode in a plating solution is to keep solution at the surface of the cathode at the same concentration as that of the plating bath. The amount of movement, the kind of movement and the distance of the travel of the cathode is dependent, almost entirely, upon the shape of the cathode.

The movement of the cathode is not new. In Alfred Roseleur's book on electroplating published in France in 1855 there is a picture of a silver plating unit in which the cathode is supported to provide movement, and also by which any desired weight of silver can be deposited. This was long before ammeters or Sangamo (watt-hour) meters were known.

Ever since Roseleur's day silver plating has been done with a moving cathode arrangement of some kind. There is no explanation in the text of any known literature on electroplating of why the movement of the cathode has an advantage over "still" plating except that higher current densities may be used. This has been found true. The reason, no doubt, is that the concentration of the solution film at the cathode is increased by additions from the solution that has not been depleted of metal, with a corresponding increase in alkali or acid ratio.

In the development of plating solutions certain standard formulas have been recognized as being the best then known to give consistent results. This being necessary for the production of good work, it is reasonable to require that the film of solution on the surface of the work should have as nearly as possible the same concentration of metals and chemicals, either acids or alkalis, as in the body of the solution. When the film of solution on the work becomes depleted in metal, the acid or alkali and the other chemicals used do not have the same relation as in the body of the plating solution and the optimum pH value is lost. In "still" plating where only convection currents of the solution can be depended upon for uniform concentration, the thickness or depth of the depleted, unbalanced solution next to the cathode, will be materially increased. It has been found that to obtain consistent results a good working formula must be followed and that the proportions of metals and chemicals must be kept within reasonably narrow limits by chemical analysis at stated periods; also there should be such agitation as will maintain u n i f o r m concentration throughout the whole solution.

In either an acid or an alkali plating solution a point can be reached where due to a low metal and a high acid or alkali content no metal will be deposited on the work. Gassing

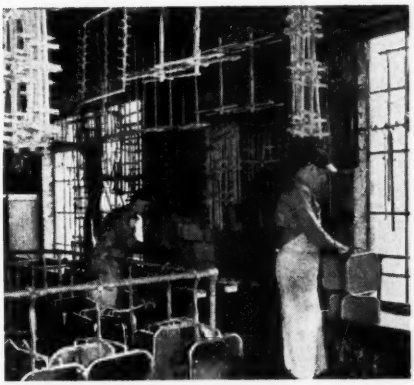
may occur, the pH of the solution may be materially changed, "burning" of work and roughness of the deposit due probably to precipitation of the hydrate of the metal, may be experienced when the film of solution at the cathode is in an unbalanced condition.

It has been stated that electrodeposited silver is very sensitive to changes that occur in the plating solution but there is some difference of opinion about the correctness of this statement. It is only in recent years that any attention has been given to the physical characteristic of electrodeposits from other plating solutions. Silver deposits have always been rated according to the flow of the deposited metal under a steel or agate burnishing tool in the hands of a skilled burnisher. The "hardness" or "softness" of the silver deposit was quickly noted and the plater was told that his solutions were not working well, or that the silver plate could be burnished easily. Many old time silver platers tested the quality of their plated silver daily with a burnishing tool in order to maintain a satisfactory deposit.

Aside from gold, no other electrodeposits were or are burnished. The high lustre on other metals is obtained by color buffing. Due to the knowledge gained by the study of metal concentration, the free cyanide content, the amount of carbonate present, the optimum temperature and the judicial use of a brightening agent, silver deposits are now obtained that do not require either machine or hand burnishing but are color buffed for the final finish.

Mechanical and air agitation of the solution have been used. Air agitation cannot be used in alkali solutions due to the effect of the air in decomposing the alkali salts. Air is commonly used in acid copper solutions for making of electrotypers' plates,

PLATERS KNOW



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but where deposits free from roughness or inclusions are required, it is not advisable to use air agitation in acid copper solution. Air is used in some special nickel solutions but in general it is not the practice to agitate nickel solutions with air. Nickel or copper solutions used in electrotype work may be air agitated as the roughness of the back of the plate is not objectionable.

There are three factors that should be considered before using air agitation in a nickel solution. Air is soluble in some plating solutions and may change the chemical composition of some of the salts in the solution. These salts may be broken up into their component parts with the result that a gas may be developed at the anode or at the cathode. Air in solution may increase the oxide content of the film at the anode or it may bring about the formation at the cathode of a hydroxyl ion; it may cause the formation of metal hydroxide precipitates and roughness or pits on the surface of the deposited metal. If, in any manner the nickel solution becomes contaminated with iron, the soluble iron will be converted to the insoluble state in which it may be electrically deposited at the cathode and the result will be pitted or rough nickel deposit.

The metal from anodes does not go directly into solution. Salts of metal are first formed by electrolysis and these are taken into solution if the condition of the electrolyte is correct, or if the salt is not of such a complex nature, that is, is soluble only slowly or not at all. Copper anodes in either the acid or alkali plating solution have a brown film when the current is flowing. This brown film is taken into solution when the current is turned off. Silver anodes in a cyanide solution are grey in color during the plating operation but are clear and semi-bright when the plating has stopped. The brown film on copper anodes and the grey film on silver anodes are indicative of the primary and secondary reactions at the anode; the primary reaction being the formation of a salt, the secondary reaction being the taking of that salt into solution.

Mechanical or air agitation of the solution has the tendency to wash off the salts of metal formed on the

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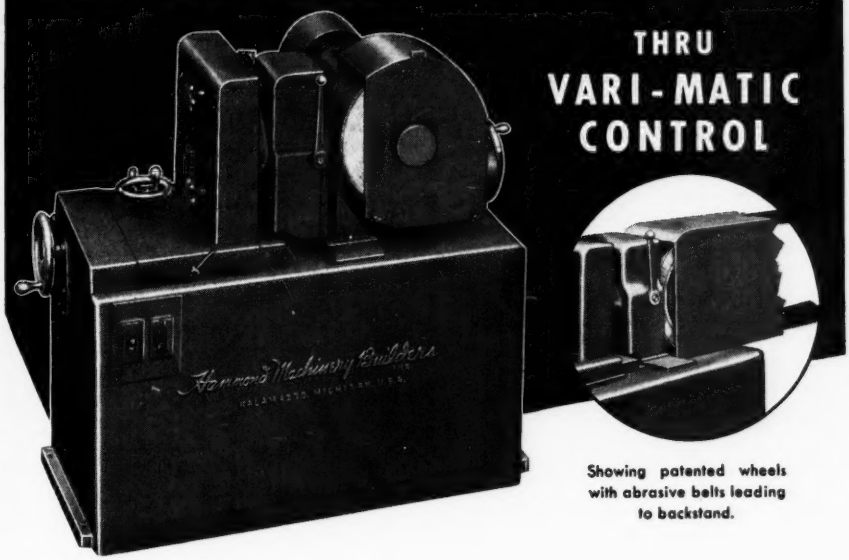

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anode. These salts will take an electrical charge and be carried over to the work. Many times, rough deposits are the result of incorrect agitation of the solution. Sludge formation in the solution can also be traced to the removal of partially electrically decomposed metal salts on the anode by solution agitation.

The better practice for agitation seems to be the movement of the cathode. The kind of movement and the rate of travel must be predetermined. If a flat piece of metal is so placed that the solution is forced against the face there will be a swirling of the solution on the back side of the flat piece of metal, not unlike the "wake" of a ship as it travels. This "wake" or swirling of the solution is often the cause of "current marks" or other peculiar formations of the deposited metal. There is no doubt that momentarily a partial vacuum is created on the surface of the metal which will result in a polarization effect and change the physical characteristics of the deposited metal. Round articles and deeply recessed parts are subject to the same effect. The agitation or rather the movement of the work must be such that no violent disturbance of the solution or "wake" effect is created. The position of the work on the rack or the supporting wire should be carefully considered to effect a smooth "cutting" of the solution with the least turbulence of the solution. It is admitted that thousands of pieces of work have been plated without attention to the foregoing points, but it must also be admitted that today the requirements of the quality, character, protective properties and distribution of electrodeposits are more severe than in any time in the history of electroplating.

Several different directions of motion of the cathode have been tried, many of which are still employed, and certain claims are made for their use which are probably only partly true, but which make a good sales appeal to a prospective customer.

A study was made of the first motion of the cathode, that is, to and fro between two rows of anodes and parallel to them. A large number of analyses were made of the silver solution around the anode and in the trough around the cathode caused by the motion of the work. It was found that there was a difference of approximately one ounce of metal per gallon in a 3.5 oz. solution between the solution next to the anode and that adjacent to the cathode. The solution at the anode was always higher in metal than the body of the solution. Attempts were made to equalize the concentration of the solution by a more rapid motion and by fastening flat pieces of Bakelite to the work rack so as to get a stirring effect in solution. In both cases the quality of the deposited silver, from a burnishing test, was adversely affected. The current density employed could not be materially increased which also worked against that type of solution. Strangely enough, the distribution of the silver deposited was also affected. On table knives made of steel a difference in the weight of the deposit of 100 per cent was found. This was confirmed in several tank loads of 30 dozen pieces. the same was true of teaspoons, although they were racked in a different way from the steel knives.

The adoption of round tanks in which the racks revolved around a certain point did not correct the trouble. Several speeds of work travel were tried with and without rotary motion of the racks. When rapid rotation was tried, the entire solution traveled around the tank with the racks. To break up this flow, baffles were placed on the side of the tank. These proved ineffec-

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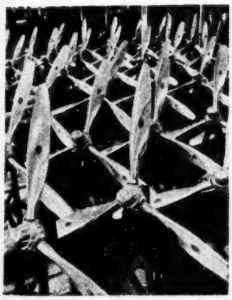

MAKE no mistake—the finishing of articles and their preparation for finishing are as technical as any processing step. Rule-of-thumb methods, still used in some shops, are now obsolete. Too much is at stake; rejections too serious a matter; production too important.

As evidence of the work Lea Technicians can do to help solve finishing problems, take the case of an important airplane parts manufacturer. Here we devised a finishing method which avoided a serious production obstacle and provided a finish entirely acceptable to the government inspectors. As a result, suggestions were issued to other manufacturers of similar parts to adopt the Lea Method.

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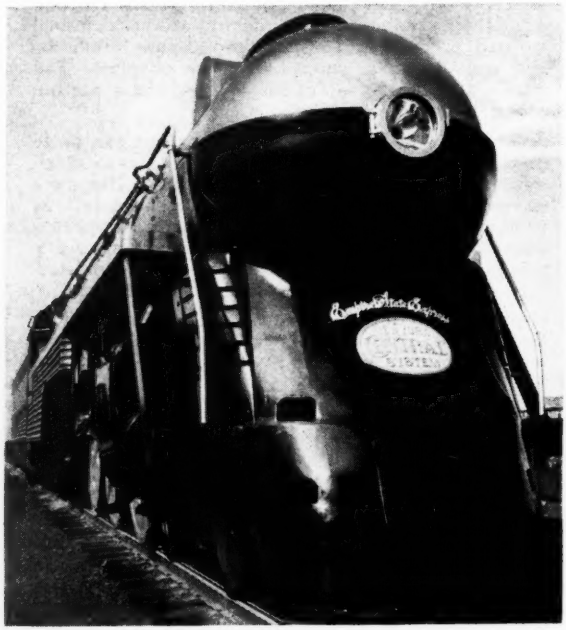
tive and gave such turbulence in the solution that the tests had to be abandoned even after exhaustive runs. The examination of nickel deposited in similar tanks indicated that the same results were obtained. Nickel deposits, however, are not examined as critically nor are the requirements of the character of the deposit as exacting as for silver. This condition is probably the reason why more attention has not been given to nickel deposits than those from other plating solutions. It is true today, however, that with the present demands made for bright nickel deposits, more attention is being given to the structure and physical properties of the deposit.

In one of the large silver plated flatware plants, a fully automatic plating machine was installed with no movement of the cathode other than that created by the travel of the work through the solution. Due to the unsatisfactory results obtained, additional agitation was found necessary. The type that proved most effective was a movement of the work toward and away from the anodes. This movement brought the rich solution at the anode and the depleted solution at the cathode into a mixture that was approximately of the same concentration as that of the body of the solution. This to-and-fro lateral movement in conjunction with the forward movement of the cathode had to be such that no swirling of the plating solution was created.

The effect of the shape of the work and its position on the rack was then noted. If a flat piece of work faced the anodes, the "wake" effect, as discussed above was evident. The same thing occurred if the flat piece faced the direction of travel of the racks in the solution. The racks then were



A Super-Hudson type locomotive operated with the new Empire State Express was designed by Henry Dreyfuss and New York Central engineers. The locomotive shown in this illustration is brilliantly finished in silver and black.

(Photo Courtesy Sherwin-Williams Company)

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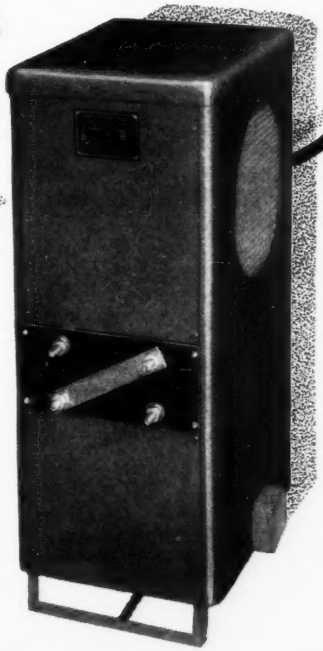

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so constructed and the articles so placed that the flat pieces cut the solution with their edge or at such an angle that there was no great disturbance of the plating solution.

It was then possible to construct a machine in which the work rack had to-and-fro motions in the directions of both the length and width of the tank, while traveling from the loading to the unloading space of the plating machine.

What was really accomplished by this multiple motion was not only a minimum turbulence of solution, but due to the equalization of the concentration of solution, a minimum amount of cathode polarization. Some attention has been given to the effect of polarization on throwing power of a plating solution, but not until the movement of the work was used to obtain a better distribution of deposits, was the polarization all over an article seriously considered. This factor was investigated quite thoroughly in the silver plating of nickel silver flatware and the results justified the investigation.

Another recommended method of agitation is the up-and-down movement of the cathode. This is effective only in nickel plating where hydrogen bubbles are likely to adhere to the surface of the work and be the cause of pitted deposits. In one plant, the cathode rod is abruptly dropped about 3 inches by the operation of a specially constructed cam arrangement. The object is to force the hydrogen bubbles off the surface of the work. C. H. Madsen went still further and intermittently removed and reimmersed the articles being plated with nickel. The hydrogen bubbles on the work were exploded when they came in contact with the air. Very excellent heavy deposits of metal were obtained by the Madsen method, but it is readily understandable that this movement is not applicable to all classes of work.

Neither up-and-down movement nor the Madsen method overcomes the differences in the concentration of the plating solution.

If higher current densities are to be used in electroplating other metals, and current distribution is needed to obtain a minimum thickness of deposit, then the nature of the agitation and the placement of work on racks must be given full consideration.

It will be difficult to definitely determine the length of stroke, the rate of travel or the best kind of cathode agitation without considering the plating solution concentration, the distance between anode and cathode and the shape of the article being plated. There is no one best movement for all equipment, all plating solutions and all classes of work.

It is recognized that such a situation presents a sales problem. The movement of the cathode is perhaps a psychological problem and can only be met by good salesmanship. It is applicable only in those cases where the requirements of the work produced call for uniformity of thickness of the deposited metal.

The ideal movement is such that causes the least disturbance of the plating solution, maintains uniform concentration and, as nearly as possible, the same relative polarization over the entire surface of the article. It is believed that the movement to and fro of the cathode between anodes, and the forward and backward motion of the work in the direction of travel from the loading to the unloading station is the best method that has been devised to date.

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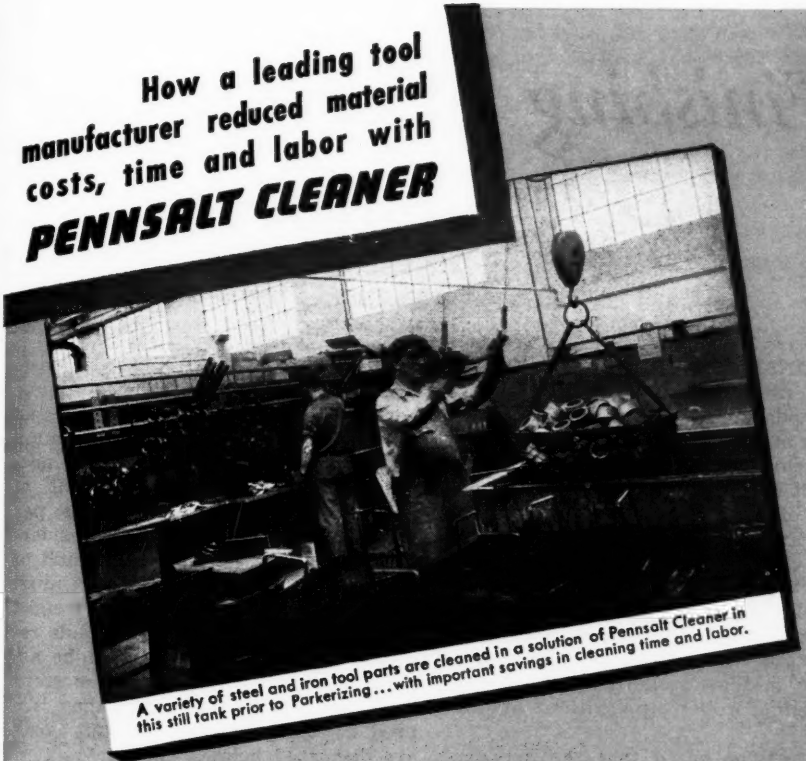

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Finishing Material Cost Determinations

By G. W. SOUTHEY

CONSIDERABLE space in the literature has been devoted to methods for the determination of the costs of finishing materials applied by spraying. Perhaps this is the natural result of the fact that the determination of such costs is somewhat difficult and, consequently, more thought and effort have been applied in this direction than on the relatively more simple problem of determining the costs of finishing materials applied by some of the other methods. This other method includes dipping, centrifuging, roller application, and so on.

It will be noted that the determination of cost of materials applied by dipping, centrifuging, and so on, was said to be relatively simple. This is so because, unlike spray application, the possible material utilization using the above mentioned methods approaches 100 per cent and the factor of estimating material losses during application may, for all practical purposes, be eliminated. Incidentally, it is not implied that any one method of applying finishing materials is better or worse than another. All methods have their advantages and disadvantages, depending on the type of work being finished and other considerations.

Bearing in mind the fact that perfect or nearly perfect utilization, and no losses during application, is assumed, how may unit material costs be determined in cases where dipping, centrifuging, roller application, and so on, are employed. Three main steps are required. First, it is necessary to determine the weight of non-volatile film forming solids per gallon of the material under consideration. Second, the cost per pound of non-volatile film forming solids must be calculated. And third, the weight of non-volatile film forming solids required to finish one unit must be ascertained. Each of these three steps and the manner in which they are used in finally arriving at unit costs are discussed below.

Weight of Solids Per Gallon

This datum is obtained as the product of the weight per gallon of material and the per cent by weight of solids in that material. Taking the symbol (W) as the weight per gallon of material and the symbol (P) as the per cent by weight of solids, the weight of solids per gallon (represented by the symbol (S) is:

$$S = \frac{(W)\ (P)}{(100)} \qquad (1)$$

Take, for example, a finishing material weighing 8.0 pounds per gallon and containing 50.0 per cent by weight of solids. The weight of solids

per gallon according to Equation (1) is:

$$S = \frac{(8.0)\ (50.0)}{(100)} = 4.0 \text{ lbs./gal.}$$

Cost Per Pound of Solids

Three data are necessary for the calculation of this item. They are: the cost per gallon of the finishing material, the cost per gallon of the thinner, and the volume of finishing material per one volume of thinner used in thinning. Assigning the symbols (M), (T), and (X) respectively to these three data, the symbol (C) to the cost per pound of solids, and using the quantity (S) as derived above, the following equation may be set down:

$$C = \frac{(X)\ (M) + (T)}{(X)\ (S)} \qquad (2)$$

For example, the material referred to under Weight of Solids per Gallon (S = 4.0 lbs./gal.) might cost $2.00 per gallon and require three to one thinning with a thinner selling for $0.60 per gallon. The cost per pound of non-volatile film forming solids is, then, from Equation (2):

$$C = \frac{(3)\ (2.00) + (0.60)}{(3)\ (4.0)} = \$0.55/\text{lb.}$$

Weight of Solids Required Per Unit

Weight of solids required per unit may be determined by direct weighings. In the case of irregularly shaped objects whose area cannot easily be measured, such as buttons, cosmetic cases and similar items, the usual procedure is to weigh a single article before and after finishing, the difference in weight being the weight of solids required.

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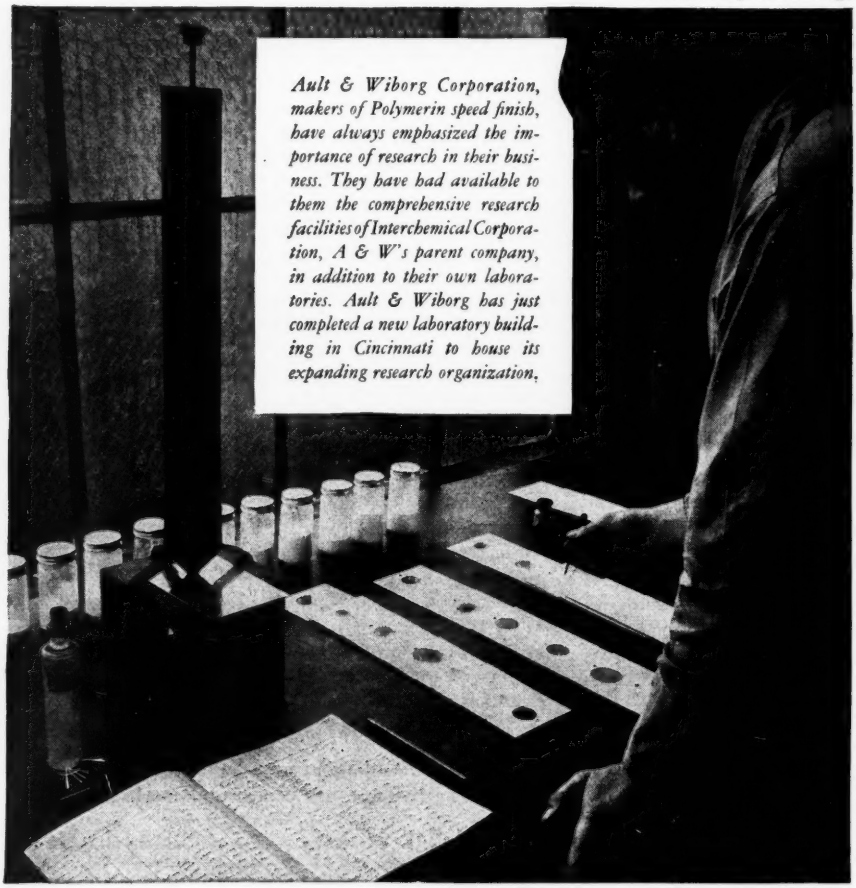

Ault & Wiborg Corporation, makers of Polymerin speed finish, have always emphasized the importance of research in their business. They have had available to them the comprehensive research facilities of Interchemical Corporation, A & W's parent company, in addition to their own laboratories. Ault & Wiborg has just completed a new laboratory building in Cincinnati to house its expanding research organization.

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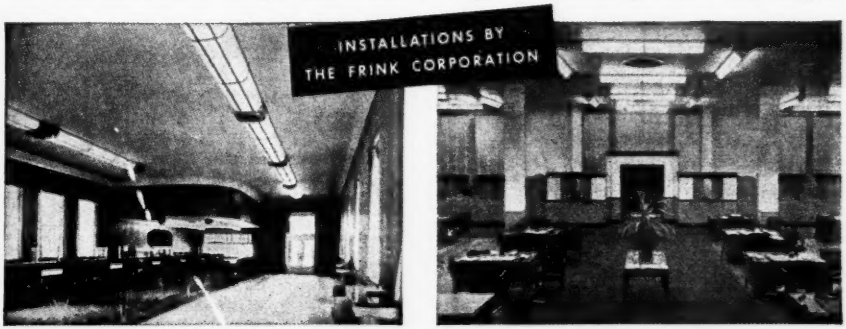
These photographs show installations of Silvray fluorescent units, manufactured by Silvray Lighting, Inc., L. I. City and finished with A & W Polymerin. Polymerin protects the metal surfaces of these fixtures and helps to keep them looking attractive and decorative. Tough and resistant Polymerin makes products last longer.



The Frink Corporation is another prominent user of durable Polymerin enamel finish. These Polymerin-finished units shown above are Frink products in the LINOLITE Fluorescent equipment line. Polymerin's smooth, lustrous surface contributes to the handsome appearance of these modern and decorative lighting fixtures.

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In the case of flat work, and particularly flat work of large size which cannot be weighed conveniently, it is expedient to take some small section (say one square inch) of the piece after finishing, determine its weight, remove the finishing material, weigh the bare test piece, and then obtain the solids required for the whole piece by multiplying the weight of solids per unit area by the area of the whole piece.

The general formula for this item is:

$$U = \frac{(A) - (B)}{(453.6)} \qquad (3)$$

where (U) is the weight of solids required to finish one unit, (A) is the weight of the article after finishing, (B) is the weight of the article before finishing, and the quantity (453.6) is a factor for changing gram weight to pound weight.

For example, a small article, finished by centrifuging, weighs 240.0 grams before finishing and 245.6 grams after finishing. Whence, from Equation (3), the weight of solids required is:

$$U = \frac{(245.6) - (240.0)}{(453.6)} = 0.01235 \text{ lb.}$$

Cost of Material Per Unit Finished

If the weight of solids per gallon, the cost per pound of solids, and the weight of solids required per unit are known, it is simple to calculate the cost of material per unit finished. The equation is:

$$Cm = (C)\,(U) \qquad (4)$$

where (Cm) is the cost of material to finish one unit and (C) and (U) are as defined by Equations (2) and (3).

By combining Equations (1), (2) and (3) the following single equation for the cost of material to finish one unit is obtained:

$$Cm = \frac{[(X)\,(M) + (T)\,(A) - (B)]}{(453.6)\,(X)\,(W)\,(P)} \qquad (5)$$

To demonstrate the use of Equation (5), the various data from the various problems above may be utilized:

A finishing material weighing 8.0 pounds per gallon (W) and containing 50.0 per cent by weight of solids (P) costs $2.00 per gallon (M). To prepare this material for use, three gallons are reduced with one gallon of thinner (X) costing $0.60 per gallon (T). This finishing material is used to finish a small article weighing 240.0 grams (B). After finishing the article weighs 245.6 grams (A).

Substituting these data in Equation (5), the cost of material for finishing the article is:

$$Cm = \frac{[(3)\,(2.00) + (0.60)]\;\;[245.6) - (240.0]}{(4.536)\,(3)\,(8.0)\,(50.0)} = \$0.00679$$

Conclusion

The method of determining finishing material costs described above will be found useful in eliminating the long and tedious trial method of making a production run using large amounts of material. From Equation (5) costs may be calculated in terms of dollars per thousand or gross or pound of work finished or in terms of the number or weight of units per dollar.

Nomenclature

A = weight of article after finishing .....grams
B = weight of article before finishing .....grams
C = cost per pound of non-volatile film forming solids .....dollars
Cm = cost of materials to finish one unit.....dollars

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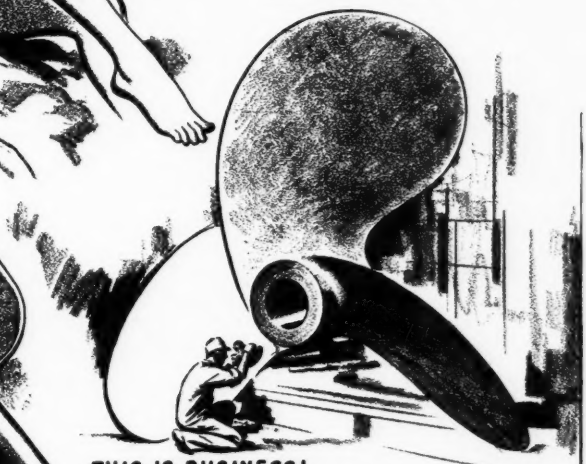

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JEWEL ABRASIVES

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M = cost per gallon of finishing material....dollars
P = per cent by weight of non-volatile film forming solids in finishing material.
S = weight of non-volatile film forming solids per gallon of finishing material....pounds
T = cost per gallon of thinner .....dollars
U = weight of non-volatile film forming solids required to finish one unit.....pounds
W = weight per gallon of finishing material...pounds
X = volume of finishing material per one volume of thinner used in thinning.
100 .....a constant
453.6 .....a constant

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Now that copper production can barely keep pace with defense needs, the use of silver in bus bars has been suggested and has more than academic interest. If government owned power plants or even those of private companies replaced copper bus bars with those made of silver, thousands of tons of high-purity copper could be released for defense applications. The silver presumably would come from reserves now idle in government vaults or from newly mined silver which the government is constantly purchasing from domestic producers. It might be lent and returned later when needs for copper are less pressing.

Silver, of course, is the best electrical conductor known and has other excellent physical properties suiting it for use in bus bars. It is easily fabricated and can be silver soldered or brazed with silver alloys in the same way that copper bus bars are brazed.

The American Silver Producers' Research Project, 82 Fulton St., New York City, states that silver is being used in place of copper, brass, and stainless steel by many manufacturers who cannot obtain these metals for non-defense requirements. Such uses appear certain to increase, since sufficient silver is available. The articles produced have high intrinsic value and can always be converted into cash when obsolete.

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Modern Gold Plating

By JOSEPH B. KUSHNER, CH.E.

Metal Finishing Consultant
New York City

THERE are a few extremely interesting applications of gold plating that are somewhat off the beaten path of ordinary commercial practice. These applications warrant interest and discussion not only for their novelty but because of the theoretical and mechanical aspects involved.

Gold Plating of Stainless Steel

There are times when it becomes necessary to gold plate stainless steel. The question may be asked: "Why gold plate stainless steel?" The chrome nickel steels are in themselves corrosion resistant and gold plating them to improve their corrosion resistance is, if we can mix metaphors, something akin to gilding the lily. However, in certain applications there are very good reasons for doing just this.

Take pen points for instance. For some unaccountable reason most people do not like to see or write with white colored pen points on their fountain pens. They like the appearance of gold. Since most of the fountain pens turned out today are priced to sell to Mr. John Public, the manufacturers don't care to go in for solid gold pen points. This being the case, the only solution is to resort to the use of gold plated stainless steel pen points. Possibly another relevant reason for gold plating the stainless steel pen points, if another reason is needed, is the fact that a gold pen point is more "writable," that is, the ink seems to flow better on a gold surface than it does on a steel surface and the "feel" is better.

In the ordinary course of events, if we are plating gold on stainless steel for purely decorative purposes, not much difficulty is encountered. After cleaning the steel in a routine manner and finishing off with an acid dip we can strike the steel in a nickel strike such as has been recommended by Wood, one containing nickel chloride and hydrochloric acid, and go on to give the work a substantial deposit of gold and have very little trouble. If, however, the gold plate must stand up under intense corrosive conditions and only flash deposits are feasible, the story takes on another angle. The problem becomes much more difficult. A case in point is the pen point or if you will excuse the punning, the nub is the nib.

Ink, is a bad customer as far as corrosion goes. It contains among other things, oxalates, chlorides and cyanogen salts and is rust-death to any metal that can't take it. You

Part 19

can prove this to yourself by dipping a piece of copper or ordinary steel into a full ink bottle. Take the metal out at once and let the ink dry on it. The iron will be covered with rust and the copper completely discolored before the day is eight hours older. The problem is to get an extremely thin deposit of gold to stand up to the repeated attack of this metal-murderer. The stainless steel that is used in fabricating pen nibs, particularly the type of rustless steel that contains molybdenum in its composition, is able to take it as far as ink corrosion is concerned, but if you put a flash deposit of gold on it in the ordinary way, the trouble starts.

Take a stainless steel pen nib, clean it well, give it an acid dip then plate it in an ordinary gold plating solution. Now permit the penpoint to rest in a little ink. Lo and behold, in a few days or sometimes less, the gold deposit will have completely disappeared from the nib or alternately, the mere application of the fingernail to the deposit causes it to peel off. The pen point may look beautiful when first gold plated but this condition invariably develops.

Another thing that may happen is that the stainless steel will actually start to rust. We speak from experience in this connection since we did a considerable amount of work on the plating of stainless steel, particularly on pen points and dentures.

Appropriately at this point, we might mention that the gold plating of stainless steel dentures is another application for the gold plating of stainless steel. The metal work of cheaper dentures is usually made of some form of stainless steel. Though many tests have shown that certain forms of stainless steel are harmless in the mouth and do not corrode appreciably, people somehow doubt that white metal can be as non-corrosive as gold. Furthermore, a lot of folks just don't care to have white metal exposed when they give out with a two by four grin, preferring instead the more affluent color of gold.

Getting back to the subject of rusting of stainless steel, we recall with annoyance a denture that received a

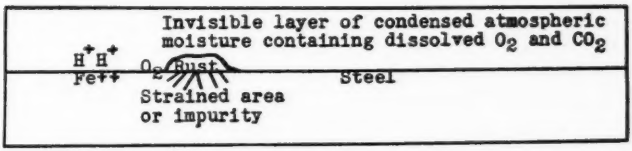

Fig. 1—Showing the sequence of events in the rusting of ordinary steel. (1) Iron being above hydrogen in the electromotive series tends to lose electrons and dissolve according to the reaction:

$$Fe + 2H^{+} = Fe^{++} + 2H$$

(2) In an area of mechanical strain or where impurities are present the potential of the steel is different from that of the main body of the metal and in consequence an electrochemical cell is set up favoring reaction (1).

(3) If oxygen is present, dissolved from the air, the O_2 tends to oxidize the ferrous ions to the ferric state:

$$4Fe^{++} + O_2 + H_2O = 4OH^- + 4Fe^{+++}$$

Gradually a precipitate forms consisting of probably, ferrous and ferric hydroxide and basic ferrous carbonate. Because one of the end products of reaction 3 leaves the field of the reaction as a precipitate, the reaction does not reach an equilibrium point and continues indefinitely towards the right, thus causing reaction 1 to do so. As the precipitate of hydroxide, and so on, which we call rust, forms, it further tends to accelerate the reaction because it helps to hold water or atmospheric moisture.

beautiful coating of gold that seemed perfectly adherent. It looked too good to be true. To test it, we put it into a glass of tap water overnight just as the man who owns a set of store teeth does or is supposed to do. The next morning, we looked at it and the denture had developed a fine bloom of rust spots. This seemed amazing, so we buffed off the rust spots, cleaned the denture again, rinsed it well and dried it out after an alcohol dip. In a short while those rust spots reappeared. We decided then and there, this was one development the dental profession could do without.

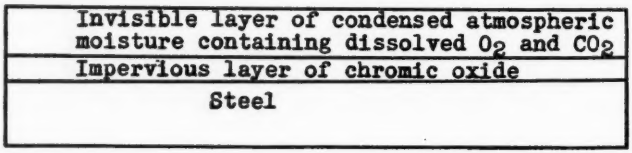
Invisible layer of condensed atmospheric moisture containing dissolved O_2 and CO_2
Impervious layer of chromic oxide
Steel

Fig. 2—Non-rusting of stainless steel. Stainless steel cannot oxidize or rust because the chromic acid forms an impervious layer that does not permit passage of the iron ions, into the solution.

The cause of this rusting or failure of the gold deposit is not very difficult to explain from the practical viewpoint though certain theoretical phases are none too clear, even at this late date. All common stainless or rustless steel contain a considerable amount of chromium. Ordinary 18-8 runs in composition as follows: Iron, 74 per cent, chromium, 18 per cent, nickel, 8 per cent, carbon, 18 per cent. We know it doesn't add up to 100 per cent exactly; it's only an approximation. According to one theoretical explanation, this chromium forms a thin, dense and passive oxide layer over the steel, protecting the iron content from the attack of atmospheric oxygen or other corrosive influences.

This protective film even though extremely thin, can be removed only by active chemical reagents such as hydrochloric acid, for example. The film of passive oxide is self healing so if the film is destroyed by an acid, it reforms almost at once if the steel is rinsed in clear water and permitted to stand in the atmosphere. If you try to plate gold directly over stainless steel with an ordinary cleaning method, you do not remove the chromic oxide film and the gold deposit fails because it is not anchored to the true metal.

If, on the other hand, you take the precaution of removing the oxide film by an acid dip before plating and make sure to go into the plating bath at once without delay so that the oxide film cannot reform, one of two things happen. Either the inhibiting acid film is destroyed at once by the high alkalinity of the bath so that the oxide film is reformed with resulting poor plate or else chlorides or other salts formed by the reaction of alkali and acid fill in the pores of the gold as it deposits.

In the first case, which occurs because electrical contact is not made with the work before it enters the gold plating bath, the gold deposit fails because it is not anchored to the metal. In the second case, the chloride or other acid salt in the pores of the flash deposit in conjunction with the electrical force developed by the presence of the gold (see previous papers for an explanation of this) breaks down the protective oxide film in the pores or does not permit it to form with subsequent development of rusting and failure of the gold deposit.

What must be looked for then, is a gold plating solution that will not cause the protective oxide film to reform before the gold plate is on and one that will not prevent the oxide

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from reforming in the pores of the deposit. Such a solution has been patented by H. S. Lukens and has been and is used in several variations in the gold plating of pen points made of stainless steel. Basically, it is a solution that contains free hydrocyanic acid. One of the first typical formulas for this solution as given in his earliest patent is:

Sodium gold cyanide.....⅛ oz.
Sodium cyanide .....8 oz.
Hydrochloric acid.....1 pt.
Water .....1 gal.

(Note: Do not try to use this formula or anything like it unless you have an adequate ventilation hood and know what you are doing. Cyanide fumes are liberated.)

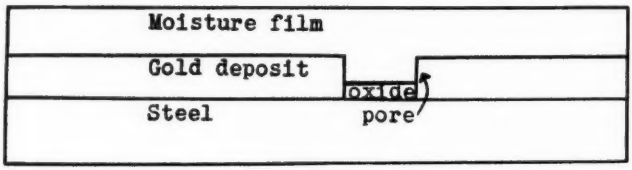

Fig. 3—Properly gold plated stainless steel. The gold is anchored directly to the steel, wherever pores exist in the gold deposit, the chromic acid layer has reformed.

In the actual method given in his patent, Lukens recommends that the pen points after cleaning be dipped into a 25-50 per cent hydrochloric acid solution to remove the protective film. Then they are immediately rinsed in a weaker hydrochloric acid solution (10-15 per cent). This is immediately followed by dipping into the gold plating bath with current on. There are no delays between the original acid dip and the gold plating bath.

After a short period of operation the carry over of acid into the gold bath increases the acidity to a point where poor deposition results. To overcome this, cyanide is added from time to time to keep the bath near the neutral point, that is, pH of 7. The formula, which reminds one in certain respects of the now infamous "Rock Island Black Nickel" of World War No. 1 days, because of the combination of active acid and cyanide, has only one justification and a mighty good one—it works.

Just why it works we are not so sure. The inventor lays much stress on the fact that the hydrochloric acid dip removes the protective oxide film and rapid immersion into the gold plating bath prevents it from reforming before the work is gold plated. But, there is more to it than that.

Most of the magic we believe, lies in the nature of the gold plating bath. The thin film of hydrochloric acid present on the work from the last rinse is not destroyed at once on entering the gold bath because the gold bath is near the neutral point. The gold ions diffuse through this acid layer and precipitate on the true metal surface. As the gold plating progresses, the thin acid film is destroyed by the increase in pH near the cathode and by diffusion and a neutral environment results, permitting the oxide film to reform in the pores of the gold deposit.

The chemical balance of the solution is fairly delicate. If the acidity of the gold solution becomes too great, the gold tends to deposit by immersion and a non-adherent deposit results. Again, if the pH of the bath rises, that is, if the bath becomes quite alkaline, the thin clinging film of acid is immediately destroyed before the gold can deposit, the oxide film is reformed and the deposit of gold will not stand up in ink.

We have tested some of the pen-

points produced and plated by the Company that owns the patent and can say unqualifiedly that they are mighty good. The gold deposit is extremely thin—there is less than .001 gram of gold per nib on the average and the deposit of gold holds up indefinitely, even though constantly used in cheap inks.

Other patents have since been granted to the same inventor and the same Company, involving the use of rhodium and platinum pre-plates, and other variations of the solution have been patented but, we believe the gold solution is still basically, the same.

In connection with the subject, gold plating directly on stainless steel, the writer was granted a patent last year on a method for accomplishing this purpose. By the writer's method, the steel after cleaning is etched in a hydrofluosilicic acid solution or an acid of this type and is then plated in a bath containing gold, cyanide, a benzoate and a formate. The presence of the latter two compounds seems to prevent the rapid reformation of the oxide film on the steel and an adherent deposit of gold results.

Eclipse Catalog No. 80. A 32-page, 8½ by 11 booklet, is now being issued by the Eclipse Air Brush Company, 400 Park Ave., Newark, N. J. It covers their complete line of spray equipment for both manual and automatic operation, in addition to their Pneumix air motored agitators for all mixing jobs in batches up to 200 gallons. Catalog No. 80 is illustrated with many pictures of the equipment in operation on various types of work.

The introductory section of the catalog outlines the reasons for the low pressure principle under which all Eclipse spray equipment operates. Copy free upon request.

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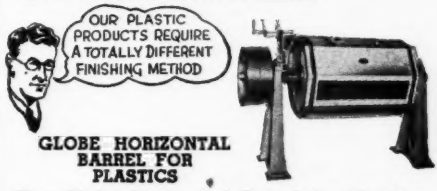

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• HINTS ON FINISHING ECONOMI

1. WATCH VISCOSITY OF ALL TO SAVE MATERIALS

▶ The U.S.A. has declared war on waste. Every finishing department should declare war on the stick or spatula test for viscosity of paint. It leads to waste of vital materials.

TOO HEAVY . . . requires higher pressures with excessive overspray and waste of materials.

NORMAL . . . Correct viscosity provides for efficient and economic application.

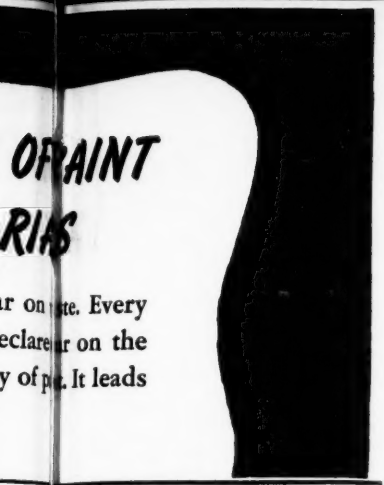
TOO THIN . . . gives excessive overspray and runs because of sagging of the finish.

2. SET A VISCOSITY STANDARD FOR JOBS

▶ The correct viscosity depends on size and shape of object, color, required hiding, film thickness, speed of work and other factors. When you find the right viscosity for a particular application . . . then stick to it! Check viscosity constantly, using a scientifically accurate method.

3. CHECK EFFICIENCY TO SAVE MATERIALS

▶ Accurate control of viscosity gives the spray operator uniform conditions. If a shop system is set and viscosity is checked before starting work, it saves hiding, and an important element is eliminated from



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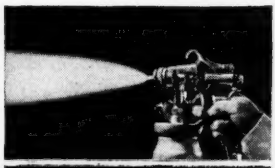

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ECK BEFOREHAND TO
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elimin from the operation.

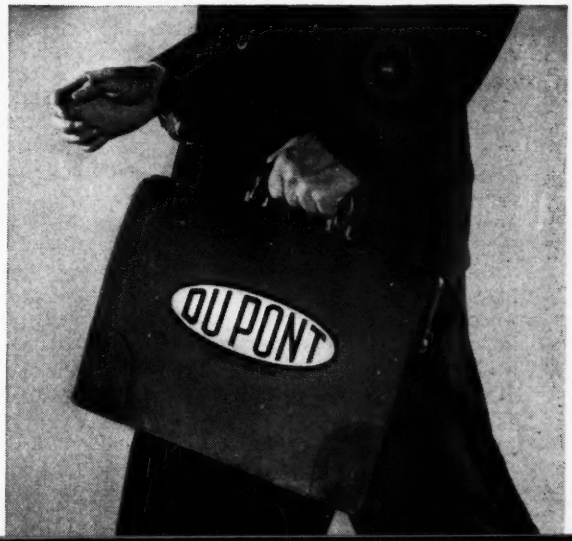
CHECK THESE 11 POINTS TO SAVE MATERIALS

NEXT MONTH READ ABOUT

1. Temperature of paint
2. Viscosity of paint
3. Air and fluid pressures
4. Adjustment of spray gun
5. Handling of spray gun
6. Triggering of the gun
7. System in the strokes
8. Uniformity of coating
9. Thickness of film
10. Causes of rejects
11. Touch-up procedure

● The Du Pont man can show you how to control these factors . . . can aid you in conserving finishing materials and lowering painting costs. And remember—he's backed by a vast chemical organization with the finest of facilities for developing, making and applying better industrial finishes. When the Du Pont Man calls on you—call on him for help. E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Wilmington, Del.

Look for a detailed discussion of each point in this monthly series.



Tin Coating of Aluminum

By EDWARD FINNIE

SEVERAL articles have been written describing the process used in applying tin to aluminum by the immersion method but none of these provide figures on production and chemical usage based on actual production over a period of time. In this article, I will attempt to describe the aluminum coating process and give actual figures taken from production in our factory during a 14-month period. In this period 3,675,258 pistons were coated.

Primarily the tin coating is applied to aluminum pistons as a preventative against scuffing and also to reduce engine break in time by providing lubricating qualities.

The first step in the immersion method of the tin coating process, after the piston is machined, is cleaning. This is accomplished by dipping the pistons in a 3.0 oz. per gallon solution of tri-sodium phosphate which is operated at a temperature of between 175 deg. F. and 185 deg. F. The pistons are immersed in the cleaning bath only until gas bubbles form on the aluminum, since the surface of pistons remaining for too long in the solution would be etched. An etched surface has been one cause of blistered plate.

Following immersion in the cleaning solution, the pistons are rinsed in cold water. The pistons are then dipped in a three per cent nitric acid solution for about 30 seconds. This dip is used only to prevent any alkali of the cleaning solution from contaminating the tin bath. A thorough rinse in cold water follows the acid dip.

The pistons are then placed in the sodium stannate bath which is made up by dissolving 6.0 oz. of sodium stannate in each gallon of water used. The tin bath is operated at a temperature between 170 deg. F. and 175 deg. F. The metal content must be kept between 0.9 and 1.5 oz. per gallon of tin. There is a tendency for free alkali to build up in the bath, however, the free alkali content must be kept below 0.3 oz. per gallon, otherwise blistering will develop in the coating. The blisters are semi-microscopic and can only be seen with the aid of a powerful hand lens or a low power microscope.

The tin content of the bath is kept up to standard by the addition of sodium stannate. The stannate is dissolved in hot water and added to the bath as required. The free alkali content is controlled by adding acetic acid, diluted one part of acid to 10 parts of water, to the bath as required.

The length of time the work must remain in the bath depends on how thick a coating is desired. Our present requirement demands a minimum thickness of .00018 in. of tin and this is obtained by immersing the work in the bath for four minutes. After the

plating operation, the work is rinsed successively in cold and hot water.

After continued operation of the bath, there is a tendency for sludge to form in the bath. This sludge, composed of aluminum, carbonates and stannic tin, must be removed from the solution periodically; otherwise, too great a concentration will cause blistering in the tin coat. The sludge is fairly valuable and, depending on the amount of tin in it, will bring from two to five cents a pound from reclaimers.

A schedule of sodium stannate and acetic acid additions can be worked out according to production. For example, we add 10 lbs. of sodium stannate to the bath after every 1,000 pistons are coated and one gallon of acetic acid after every 2,000 pistons are coated. These additions keep the metal content within the specified range and keep the alkali content below 0.3 oz. per gallon. Therefore, chemical analysis is not necessary each time tin or acid should be added to the bath, but an analysis for tin and free alkali should be performed at least once a day in heavy production.

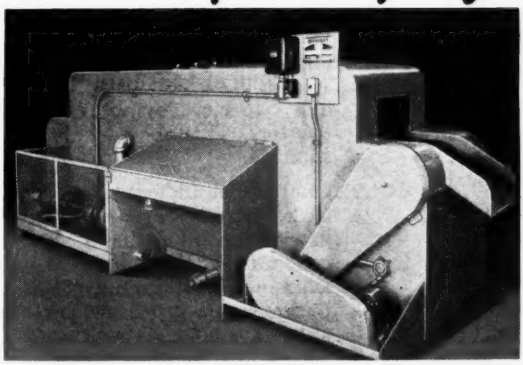
In the period covering 14 months, we coated 3,675,258 pistons each having approximately 75 sq. in. of surface. 35,986 lbs. of sodium stannate and 1,488 gal. of acetic acid were used in the process to coat these pistons with an average coating thickness of .00018 in. of tin. Each piston required .00979 lbs. of sodium stannate and .000404 gal. of acetic acid in the process.

Methods of Analysis

Determination of Tin

A. Solutions required.
   1. C. P. Hydrochloric acid.
   2. Saturated Sodium Bicarbonate solution.

A small package of **RANSOHOFF EQUIPMENT**



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3. Starch solution — 1 gram soluble starch dissolved in 150 c.c. hot water.
4. Potassium Iodate solution—dissolve 1.43 grams of potassium iodate, 10.0 grams potassium iodide, 1 gram potassium hydroxide in distilled water and dilute to one liter and standardize.

B. To standardize potassium iodate solution.
1. Weigh 0.5 grams solder having a known tin content and place in a 500 c.c. erlenmeyer flask.
2. Add 20 c.c. conc. sulfuric acid and boil until there are no particles of metal showing.
3. Add 150 c.c. distilled water and 60 c.c. conc. hydrochloric acid and two grams powdered antimony metal. Insert a one holed rubber stopper with a glass tubing bent U-shaped in the flask and boil 25 minutes.
4. Before removing flask from flame and while solution is boiling, immerse the outer end of the glass tube into a beaker of the saturated bicarbonate solution. Place both beaker and flask in cold running water. As the flask cools, the bicarbonate will be drawn in, creating an atmosphere of carbon dioxide and preventing oxidation of the tin.
5. After the solution is cool, remove the delivery tube and filter solution through an asbestos pad using suction.
6. Immediately add three c.c. of the starch solution and titrate to a blue color using the potassium iodate solution.
7. The number of grams of tin used divided by the c.c. of iodate used gives the factor. The tin factor for one c.c. of potassium iodate should be about .0026 grams.

C. Determination of Tin in the bath.
1. Take five c.c. of clear cold plating solution and dilute with 150 c.c. of distilled water.
2. Add 60 c.c. conc. hydrochloric acid and two grams of antimony metal.
3. Insert stopper with delivery tube and boil for 15 minutes.
4. Continue as outlined above in standardization of iodate solution.

To calculate the amount of tin in the bath use the following formula:

$$\frac{\text{c.c. iodate} \times \text{tin factor} \times 1000}{5 \text{ c.c.}} \times .134 = \text{oz. per gal. tin}$$

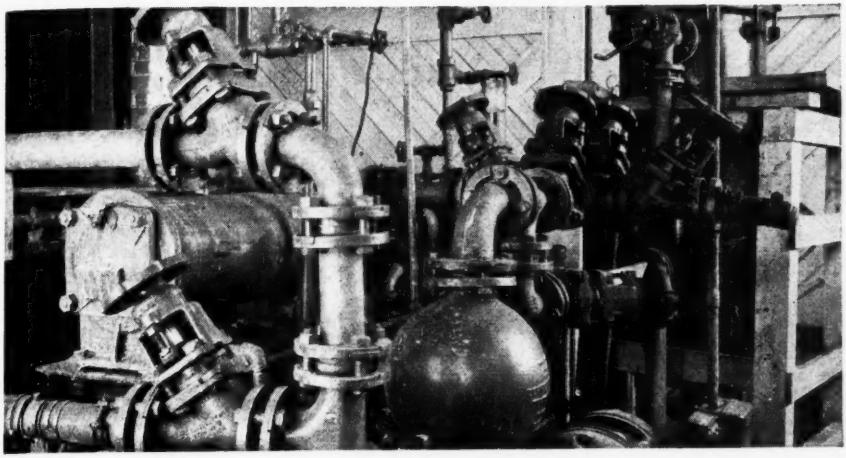
Determination of Free Alkali

A. Procedure.
1. Take a 10 c.c. sample of clear plating solution into a 250 c.c. flask.
2. Add 100 c.c. of distilled water and two c.c. of Thymol Violet indicator.
3. Titrate with 0.1 N acid until color matches standard.
4. 1 c.c. of 0.1 N acid equals 0.0536 oz. per gallon free alkali.

B. Color Standard.
1. Take 10 c.c. of a 6.0 oz. per gallon distilled water of sodium stannate.
2. Add 100 c.c. of distilled water and two c.c. Thymol Violet indicator. This should be a clear solution.

C. Thymol Violet Indicator.
1. Make a 0.01 per cent solution of Tropaeolin 0 using 50 per cent Ethyl alcohol.
2. Dissolve 0.04 grams Thymolphthalein in 50 c.c. 95 per cent Ethyl alcohol. After dissolving add 50 c.c. distilled water.
3. Make the indicator solution by using 12 parts (by vol.) of the Tropaeolin 0 and five parts (by vol.) of the Thymolphthalein solution and mixing.

DURIRON VALVES
and Nickel-Plating Solutions



This intricate-appearing, but simple, arrangement of Duriron Y Valves and Duriron Pipe and Fittings controls bright nickel solution in the plant of Lyon, Inc., Detroit.

The Duriron Y Valves control the plating solution to the plating tank, through four Duriron Heat Exchangers and a filter, and back to the plating tank. Provision is made for by-passing the Heaters or the filter, as desired.

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The DURIRON COMPANY, Inc.
DAYTON, OHIO

Infra-Red Lamps Dry Transformer Tanks in Eight Minutes

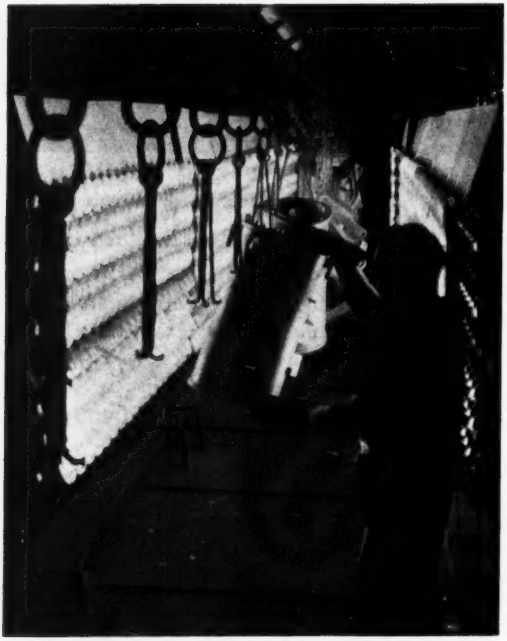

Fig. 1—Dry in 8 minutes. A dry transformer tank is removed from the production line at the Westinghouse transformer division 8 minutes after it was given a fresh coat of paint at the other end of these two batteries of infra-red drying lamps. Consuming a total of 342,000 watts of electricity, the lamps dry paint six to eight times as fast as the steam-heated ovens formerly used, thus helping to speed production of national defense power equipment.

A BATTERY of 1,368 infra-red lamps is helping speed production of electric transformers for defense by doing an hour's job in 8 minutes.

The electric drying lamps dry transformer tanks from six to eight times as fast as the former method, according to H. V. Putman, manager of the Westinghouse transformer division, Sharon, Pa. The lamps are no more expensive to install or maintain than the old steam heated baking ovens, but has stepped up tremendously the production of production of distribution tanks at a time when speed is of utmost importance. Westinghouse has increased its production of distribution transformers 65 per cent in the last year, and at present nearly 50 per cent of the output is being supplied to the Army and Navy and to industrial plants engaged in national defense production. These small transformers are an important link in the pro-

duction of light and power for air fields, munition plants, naval bases, shipyards, fortifications, cantonments, and the Panama Canal.

In the painting process, the transformer tanks are hung by hooks from an endless conveyor chain. Traveling at four feet a minute, the tanks first pass a workman who paints them inside and out in a few seconds with a spray gun. Then the tanks take their 8-minute ride between the two banks of drying lamps where infra-red radiation dries the paint by raising its temperature quickly to about 300 deg. F. Each bank of lamps is about four feet high and 32 long. They consume a total of 342 kw which is enough to supply the normal lighting requirements of more than 500 average homes.

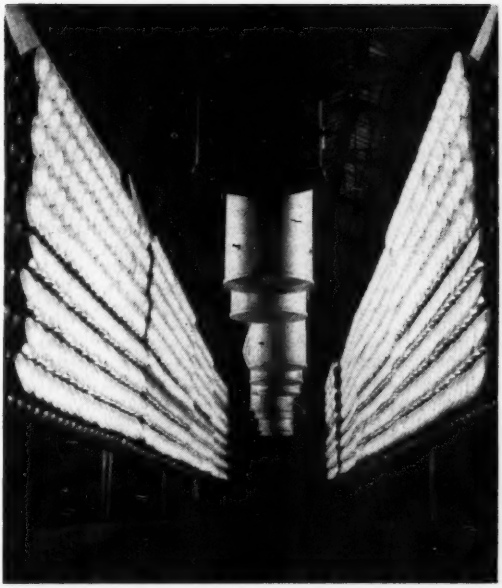

Fig. 2—"Sun-Lights." More than 1,300 concentrated beams of the same invisible infra-red heat rays found in sunlight have cut to 8 minutes the required drying time for these painted transformer tanks on the production line at the Westinghouse transformer division. Recently installed to help speed mass production of electric power equipment for national defense plants, these two batteries of Westinghouse 250-watt drying lamps dry paint in a minimum amount of time.

The present installation dries only the base coat of paint. But more lamps and special machinery are being installed to make it possible to spray and dry both base and finish coats in one continuous, 25-minute operation. To make this possible, a cooling chamber is being installed to bring the temperature of the tanks down to about 150 deg. after they emerge from the first drying. Such cooling will prevent "blistering" of the finish coat as it is sprayed on.

The infra-red lamps are 250-watt units combining both lamps and reflector in a single hermetically-sealed bulb. They produce a narrow, concentrated beam of radiant heat energy, with less than five per cent of their total energy emitted as visible light.

Infra-red radiation is a form of heat that travels in a straight line through air or space. Therefore, most of the heat from the lamps goes directly into the paint, causing it to dry much more rapidly than in the steam-heated ovens where heat is transferred slowly from air to the paint.

The principle on which these lamps do their heating and drying job is as old as the sun itself. The sun emits invisible infra-red heat rays that travel more than 90 million miles through sub-zero space, yet produce warmth on the earth to make it habitable. Approximately 50 per cent of the sun's energy is comprised of such rays by the time it reaches the

earth. Our engineers have simply built a lamp that produces these heat rays in great proportion to their light rays.

"Bakelite C-9 Resins for the Paint and Varnish Industry" is now being issued by Bakelite Corporation, Unit of Union Carbide and Carbon Corporation, New York, N. Y. C-9 Resins are an entirely new group of synthetic resins which supplement the Bakelite phenolic synthetic resins so widely employed in the paint and varnish industry. Their fundamental ingredient is Carbic anhydride, a development of Carbide and Carbon Chemicals Corporation. Coatings based on Bakelite C-9 Resins and soft oils are said to possess the following highly desirable properties: good color retention, remarkable mar-proofness, retention of flexibility on aging, excellent adhesion, water and solvent resistance, durability, and package stability. C-9 Resins are divided into two types as follows: Type I—Liquid, Oil-Reactive Bakelite C-9 Resins; Type II—Solid, Resin - Modified Bakelite C - 9 Resins.

The booklet describes the various types of Bakelite C-9 Resins that have been developed for the production of both heat-reactive and air-drying coatings, and indicates suggested applications. Emphasis is also placed on their use with domestic oils such as linseed, soya, and dehydrated castor. Model formulations for various purposes may be secured by varnish manufacturers from the development laboratories of Bakelite Corporation, Bloomfield, New Jersey.

Copies of the booklet are available from Bakelite Corporation, 30 E. 42nd St., New York City.

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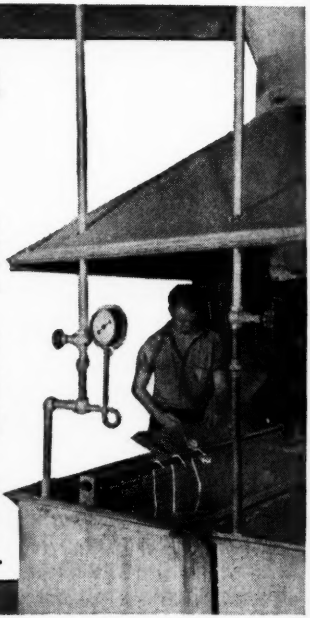

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NORTON COMPANY, WORCESTER, MASS.

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NORTON ABRASIVES

Dust Control in the Finishing Department

Attention given to the small details covered in this article may mean the difference between good and bad finishing results.

By J. WELSBY

Foreman, Finishing Department, Remington-Rand Limited
Hamilton, Ontario, Canada

ONE of the chief causes of finished parts being rejected by the Inspection Department is dirt, or rather dust, that settles on the wet work and consequently is baked into the finish. In order to reduce rejects to a minimum it is necessary to get down to the cause of the trouble and then find ways and means of preventing dust and dirt from finding their way into the finishing room.

We formerly had a fairly large percentage of our finished work rejected for being dirty, and by being dirty I mean a few specks of dirt or lint baked into the finish. Our product carries a high-class finish and an odd speck or two is enough to reject any of its component parts. In order to eliminate or rather try to cut down on these rejections, we have put into operation a system of regular cleaning of ovens, equipment, and air that has helped us considerably and I will describe them in detail as near as possible.

In the first place, we found that upon opening the finishing room door, the exhaust fans on the spraying booths drew in dirt and dust from the outside, which, when the door was closed remained suspended in the air, and in passing through the booths toward the exhaust fans, stuck to the wet surfaces being sprayed. In order to solve this problem, we installed a fan near the ceiling that delivered about three times as much air as the exhaust fans were discharging. The result was a room that was always under pressure and when the door was opened the dirt and dust were blown out instead of being sucked in. The doors were ordinary doors on hinges, which we replaced with a large sliding door which could be opened by inches instead of being thrown wide open in an instant.

The air that is being delivered into the finishing room is passed through a filter and then blown against a large baffle that is made up of a wooden frame and filled with spun glass which is dampened with oil occasionally. This catches any dust that may pass through the filter. The filter is composed of a large frame, Fig. 1, that totally encloses the fan. The filter panels are made up as follows:

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922 So. Bronson Street
Los Angeles, Calif.

There are three panels on each side, one each on the top and bottom and six panels on the front. The panel frames are made up of wood. The outside wire is ½ in., diamond shaped builders metal lath. This is laid on the frame and fastened securely. A second layer of copper fly screen is then applied and also fastened. Spun glass batting 6 in. wide is then laid on this across and then up and down. Another panel of fly screen is applied before fastening the metal lath. The outside frame is then put on and the entire unit securely fastened and oil sprayed. We change the spun glass bats every three months at a cost of approximately $0.25 per panel. Before we started using this style of filter, our fan was enclosed with No. 220 copper wire cloth at a cost of approximately $2.00 and it cost about $6.00 per week to keep it clean. As it soon plugged up, it had to be taken apart and washed in gasoline, which was not only expensive but extremely dangerous.

The finishing room floors are oiled every night and the booths scraped and exhaust fans cleaned thoroughly. After cleaning, the booths are greased with a special tacky grease on the entire insides. All the oven trucks are blown off and dusted with brushes before being allowed in the finishing room. The work rods on these trucks were descaled and nickel plated in order to prevent small pieces of scale from dropping down to the wet finished parts.

Nothing is allowed in the finishing room unless it is perfectly clean and no person, other than the operators, is allowed in the room when spraying is going on. All the dipping hooks and spraying fixtures are burned off once a week and then washed in varsol before being put into use again. Twice a week the ovens are thoroughly cleaned out. This is accomplished by blowing out the ovens with a special gun. It is an ordinary dusting gun. The nozzle that was taken off and a piece of brass tubing 2½ ft. long brazed on the nozzle replaced on the end. With this gun the operator can get at all angles and corners that would otherwise be inaccessible to any ordinary gun. After this operation, the ovens are sprayed with water and the drafts are opened up.

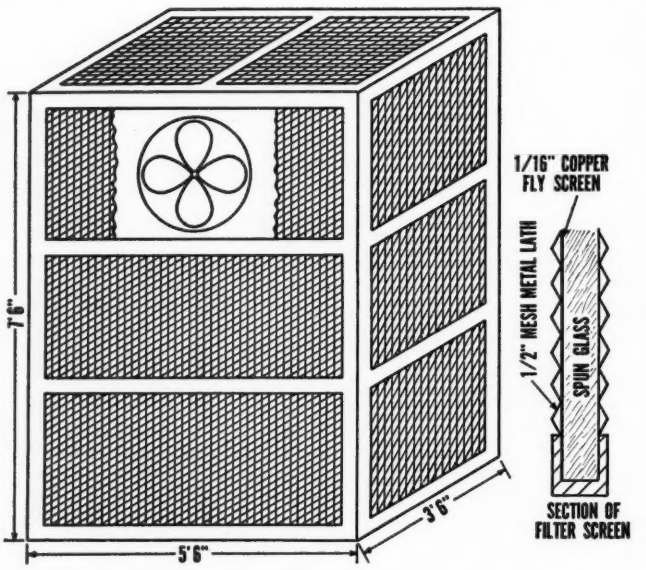


Fig. 1—Diagram illustrating the construction of an air filtering unit designed for a metal finishing department.

A WAR MESSAGE
to
ALL EMPLOYERS

★ **From the United States Treasury Department** ★

WINNING THIS WAR is going to take the mightiest effort America has ever made—in men, materials, and money!

An important part of the billions of dollars required to produce the planes, tanks, ships, and guns our Army and Navy need must come from the sale of Defense Bonds. Only by regular pay-day by pay-day investment of the American people can this be done.

Facing these facts, your Government needs, urgently, your cooperation with your employees in *immediately* enrolling them in

A PAY-ROLL SAVINGS PLAN

The voluntary Pay-Roll Savings Plan (approved by organized labor) provides for regular purchases by your employees of Defense Bonds through voluntary pay-roll allotments. All you do is hold the total funds authorized from pay-roll allotments in a separate account and deliver a Defense Bond to the employee each time his allotments accumulate to an amount sufficient to purchase a Bond.

You are under no obligation, other than your own interest in the future of your country, to install the Plan after you and your employees have given it consideration.

WHAT THE PAY-ROLL SAVINGS PLAN DOES

1. It provides immediate cash now to produce the finest, deadliest fighting equipment an Army and Navy ever needed to win. **2.** It gives every American wage earner the opportunity for financial participation in National Defense. **3.** By storing up wages, it will reduce the current demand for consumer goods while they are scarce, thus retarding inflation. **4.** It reduces the percentage of Defense financing that must be placed with banks, thus putting our emergency financing on a sounder basis. **5.** It builds a reserve buying power for the post-war purchase of civilian goods to get our factories running after the war. **6.** It helps your employees provide for their future.

To get full facts on installing the
Pay-Roll Savings Plan, write TODAY to:
Treasury Department, Section B,
709 12th Street, NW.,
Washington, D. C.

U. S. Defense BONDS ★ STAMPS

This space contributed to National Defense by
PRODUCTS FINISHING

the doors closed and the heat turned on slowly until dry. By using these methods we are reasonably sure that our ovens are clean and as free from dust as it is possible to get them.

Now the air line may need attention from time to time. We all know that there is a certain amount of oil and water in every air line and if this is not trapped or taken care of, it gets through the line in spite of the air transformers at the booth. In our air line just before it enters the finishing room we have a filter which cost very little and does a very efficient job of air cleaning. The air line is so constructed that it can be coupled up to the steam line and is blown out with high pressure steam when the occasion arises.

All the workpieces to be finished are blown off and dusted with good tack rags before going into the finishing room. The dusting of all trucks and work rods is done with brushes instead of cheese cloth dusters. With the ordinary duster, pieces of lint and cotton are caught on the trucks and rods and are carried into the finishing room.

By using the methods suggested here and by strictly supervising all cleaning operations results were obtained that, while not 100 per cent perfect, were very gratifying and have reduced rejects due to dust to a minimum.

Recommended Levels of Illumination for Industrial Interiors

The illumination table listed below for industrial interiors is the result of recent findings and observations by the Westinghouse Lamp Division, Westinghouse Electric & Manufacturing Co., Bloomfield, New Jersey.

It is based on the scientific fact that existing foot-candle levels should be at least doubled if measurable and significant improvement in seeing are to result. In addition, the new recommendations give full weight to the improvements. The values shown should be provided on the work regardless of whether in a horizontal, vertical, or oblique plane.

Activity	Foot Candles
Machine Shops:	
Rough Grinding, Medium Buffing and Polishing...	30
Fine Buffing and Polishing	100
Paint Shops:	
Dipping, Spraying, Firing, Rubbing, Ordinary Hand Painting and Finishing.	20
Fine Hand Painting and Finishing	50
Extra Fine Hand Painting and Finishing	100

1942 Plastics Catalog. To meet the need for an authoritative, timely, and complete source of information on plastics, the Plastic Catalogue Corp., 122 E. 42nd St., New York, N. Y., has published a second edition of the Plastics Catalog, which is available at the price of $5.00 per copy. More than 600 pages of documented facts, bolstered by charts and informative illustrations, make the Plastics Catalog an invaluable source of information and reference for anyone connected with or interested in the plastics industry.

Divided into 10 sections treating every phase and aspect of plastic development and the plastic industry as of today, the catalog includes an exhaustive treatment of "Plastics in Defense." In this section is presented a complete

story of the role of plastics in the defense program—a story of plastics as a factor in the vital business of war and of its positive contributions to America's defense in the air, on land, and on the sea. The section also includes a competent and informative discussion of the plastics industry as affected by priorities.

The Materials Section comprises approximately 150 pages of concise information compiled by experts and designed to include every new development of any significance in the plastics field. The section includes 25 articles, with special treatment being given to phenolic-asbestos compositions, polyterpene hydrocarbon resins, and shellacs.

The Plastics Engineering Section has been expanded to almost three times its original size. Flow sheets showing at a glance the manufacturing procedure involved in producing each type of material, supplemented by photographs and illustrations, combine to make this section a storehouse of important technical information.

The Machinery and Equipment Section is complete with photographs of every type of press used in the plastics industry and every type of machine, plant equipment, and assembly device figuring in the manufacture or processing of plastics today.

The sections on Laminates and Vulcanized Fibers, Plastic Coatings, and Synthetic Fibers and Rubbers have all been extended to include new developments up to press time.

The now famous Plastics Properties Chart has been revised and amended and is now a self-contained unit of inestimable value to the plastics manufacturer whose many problems may be solved by a reference to this chart. The Solvents and Plasticizers Charts have been brought up to date.

The Index and Directory Section, reflecting the phenomenal growth of the plastics industry during the past year, has been expanded to almost three times its original content. It includes complete lists, alphabetically arranged for quick and easy reference, of all molders, laminators, fabricators; names and addresses of manufacturers; trade names; personnel and equipment, as well as a selected bibliography and a list of educational institutions devoted to plastics.

To "Keep 'em Flying" you must "Keep on Buying" Defense Savings Bonds and Stamps regularly.

So-o-o--- Chlorinated Solvents are Short!

TWO VARIATIONS

Magnus Emulso-Dip and Magnus Emulso-Spray are two variations of the same new method. • Either can be used in many instances on existing metal washing machines with little alteration. • On many jobs, washing machines are not necessary. You can set up the necessary tanks and sprays yourself. • Where volume and the nature of the job make a new washing machine necessary, we will design Magnus Emulso-Dip or Emulso-Spray Washing Machines to meet your problems.

Here's an Unrestricted Material That Cleans by a Better Method!

The Magnus Emulso-Cleaning Method replaces solvent or vapor degreasing. It actually costs less to do a better, quicker, more dependable job, even on smut and difficult dirts on which other methods fail.

This method has been successfully used for many months in defense plants all over the country.

It is applicable to **all** types of metal cleaning and can be used **without** heat on many operations.

If you are interested in sure-fire metal cleaning to insure steady, speeded-up production in the months ahead, write to us **now** for full details.

MAGNUS CHEMICAL COMPANY
208 South Avenue **Garwood, N. J.**

MAGNUS CLEANERS

Coatings for Protecting Metal from Soil Corrosion

CONCLUSIONS drawn from previous inspections of various metallic and non-metallic coatings exposed to soils are generally confirmed by the results of recent inspections reported by K. H. Logan in a paper designated (RP1446) in the Journal of Research). The protection of steel by zinc coatings depends on the thickness of the coating and is not appreciably affected by the kind of base metal. In a group of mildly corrosive soils, a specially applied coating of approximately three ounces of zinc per square foot prevented pitting almost entirely for an exposure period of 16 years, the duration of the test. In a group of generally corrosive soils, however, a commercial three-ounce coating did not entirely prevent pitting over a two-year period. This result is not consistent with previous tests of heavy zinc coatings in corrosive soils, in which pitting was almost entirely prevented for 10 years, the maximum period of exposure. The suggestion is advanced that uniformity is a prerequisite for adequate protection by zinc coatings in soils.

Lead coatings applied to iron and steel have not proved adequate for protection underground. Since the potential of lead is cathodic to that of iron, lead cannot protect iron or steel in the manner that these metals are protected by zinc. As the rate of corrosion of lead is appreciable under many soil conditions, a continuous layer of lead isolating steel from its environment usually cannot be maintained.

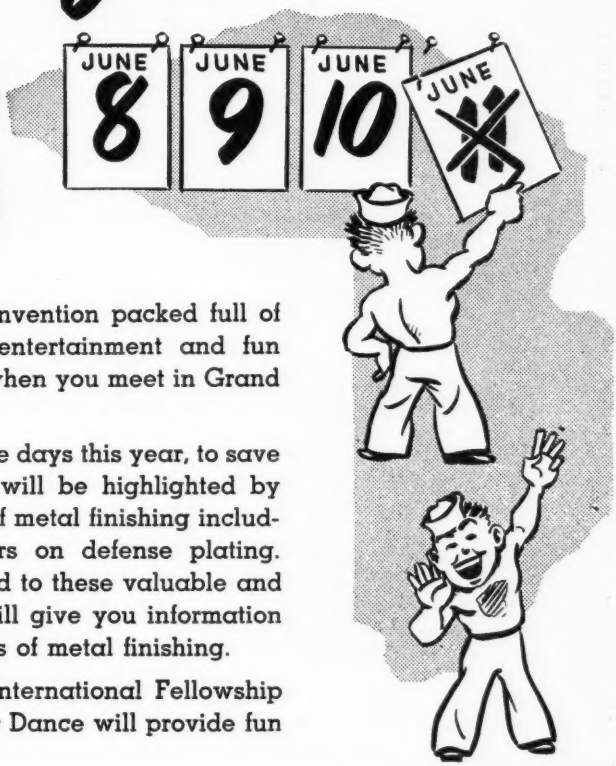
A coating of tin was of little benefit in protecting copper from corrosion in soils. Under certain conditions one or more of the tin-copper alloy layers may be cathodic to copper, a condition which would accelerate corrosion.

The condition and protective value of a variety of experimental coatings after limited periods of exposure are discussed. These coatings include various synthetic resins, chiefly of the phenolic group, various types of rubber and synthetic rubber, vitreous enamel, and so on. In this group of coatings, a vitreous enamel and two hard-rubber coatings provided complete protection for seven years. A phenolformaldehyde (Bakelite) coating, consisting of several coats of Bakelite varnish, with each coat baked on, provided satisfactory protection for two years, the extent of the exposure.

Defense Savings Bonds may be registered in the name of one individual, or of two individuals as co-owners, or one individual and one other individual as beneficiary.

Stripped for Action!

GRAND RAPIDS



A THREE DAY convention packed full of interesting papers, entertainment and fun are in store for you when you meet in Grand Rapids in June.

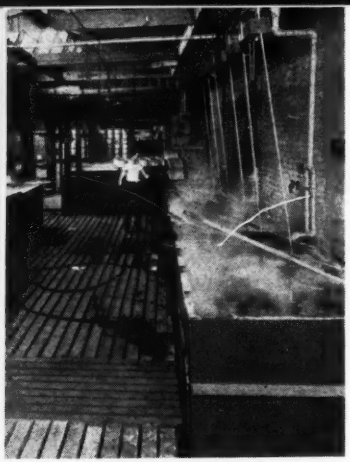
The Convention, three days this year, to save your valuable time will be highlighted by papers on all types of metal finishing including important papers on defense plating. Four sessions devoted to these valuable and instructive papers will give you information on the latest methods of metal finishing.

For relaxation, the International Fellowship Party and the Dinner Dance will provide fun and entertainment.

AMERICAN ELECTROPLATERS SOCIETY

30TH NATIONAL CONVENTION

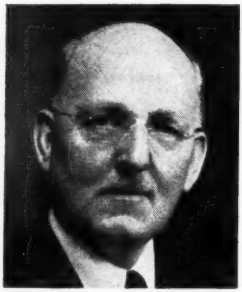
JUNE 8 - 9 - 10



News OF THE INDUSTRY

George B. Hogaboom Appointed to Key Position

According to a recent announcement, Mr. George B. Hogaboom has been appointed consultant of electroplating and finishing at the Bureau of Industrial Conservation and Substitution. This



G. B. Hogaboom

bureau is one which has been set up under the War Production Board which succeeded OPM. In his new position, Mr. Hogaboom will be in complete charge of this branch of the bureau.

During World War I, Mr. Hogaboom was appointed advisor on electroplating and finishing of metals for the Army and Navy. His work at that time was under the supervision of the Bureau of Standards.

Quaker Chemical Pays Bonus

In accordance with company policy, the Quaker Chemical Products Corporation, Conshohocken, Pa., distributed a portion of 1941 earnings to all office, factory, and laboratory employees. Each employee received his or her share of the profits in the form of a bonus which was based upon present salary, years of service, and the value of the individual to the corporation. Some employees received the equivalent of three months' salary in the form of the bonus paid at the end of the year. This bonus payment is in addition to a similar bonus payment paid in July of 1941.

Lea Manufacturing Co. to Represent Paasche

According to a recent announcement, The Lea Manufacturing Co., 22 Cherry St., Waterbury, Conn., has taken over sales and distribution in Southwestern New England of the Paasche line of lacquer and paint spraying equipment made by Paasche Airbrush Company, Chicago.

Friend Discusses Metal Corrosive Resistance in Air Conditioning

In water-recirculating air conditioning systems, non-ferrous metals and alloys and stainless steels are most resistant to corrosion in the washed air stream just beyond the eliminators where corrosive conditions are particularly severe, Wayne Z. Friend pointed out in a recent paper.

Mr. Friend's paper, entitled "Corrosion Tests in a Water-Recirculating Air Conditioning System," was delivered before a Technical Session of the Annual

Meeting of the American Society of Heating & Ventilating Engineers. The presentation results from an investigation sponsored by the Research Technical Advisory Committee on Corrosion of the society.

The speaker, who is with the Development and Research Division of The International Nickel Company, Inc., 67 Wall St., New York City, stated that corrosion tests of 18 ferrous and nonferrous metals and alloys were made in the air conditioning system at the National Broadcasting Company. The tests were made in wash water in the bottom of the humidifier and also in washed air stream beyond the eliminators. The corrosion rates of all metals and alloys tested in the dichromate-treated wash water, Mr. Friend declared, were extremely low and confirm the effectiveness of this treatment.

Oakite Appoints Co-ordinator of War Industries Work

To further enlarge the extensive aid it is rendering to war production plants, Oakite Products, Inc., has appointed A. H. Bond as co-ordinator of its War Industries Work. Through Mr. Bond, information on the latest developments in production cleaning and related manufacturing operations essential to the manufacture of artillery, tanks, airplanes, rifles, shells, cartridge cases, helmets, and other direct war goods will be made readily available to various Government officials and manufacturing executives.

Mr. Bond's long experience as a production engineer, and his extensive knowledge of industrial cleaning and related manufacturing operations will, it is felt, be of especial value to engineering, procurement, and production officials. His work will supplement the direct field service activities of the more than 125 Oakite Service Representatives in all sections of the country, and their New York Headquarters Technical, Research, and Service Staffs and will place the combined war production experience of the Oakite organization at the disposal of those who can use it to the maximum advantage.

After being graduated from the North Carolina State College with a Degree in Mechanical Engineering, Mr. Bond did special engineering work with the U. S. Signal Corps, War Dept., Washington, D. C., covering design and development of field signal equipment. This was followed by engineering work

. . . outstanding for Service and Economy

***Genuine* BIAS BUFFS**

This applies perfectly to the Genuine BIAS Buff, because of these important points.

1 Best Material

2 Unique Construction

3 Better Workmansip

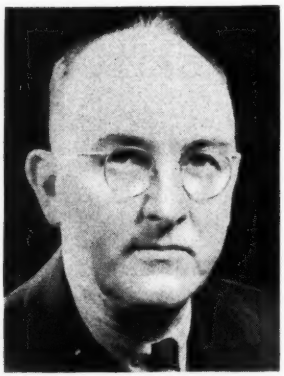
—and the blending of these features into Genuine BIAS Buffs has placed them far in advance of the ordinary class, and helped users to choose the *best* from the inferior, at a big saving and higher satisfaction.

Try them and KNOW.

The BIAS BUFF *and* WHEEL CO., Inc.
430 Communipaw Ave.
Jersey City, N. J.

with a large steel organization covering design of mobile artillery and design and development of special tools, jigs and fixtures for manufacturing ammunition.

During the First World War, Mr. Bond served in the Ordnance Dept., Washington, D. C., in the capacity of



A. H. Bond

ordnance engineer on the design and development of mobile and railway artillery and equipment. Part of this responsibility included follow-up and consulting on procurement, production, inspection and final testing of millions of dollars of ordnance equipment. During this period he also edited and published for the Ordnance Dept. two service handbooks or manuals on the 12 in. gun and railway carriage, Model of 1918, and the sliding railway mount, Model 1919, for 10 in. gun.

From 1920 to 1923, Mr. Bond was manufacturing executive of a large midwestern plant which manufactured a wide variety of material handling equipment. This was followed by four years of consulting and development engineering and investigating work in the U. S. A., Europe, and Africa. In 1928 he became a service engineer with the Oakite organization and has spent his time since then in Milwaukee and through Wisconsin and upper Michigan serving manufacturing and other plants in that area.

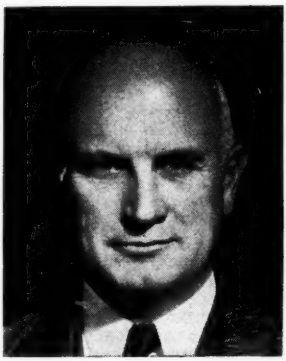
While Mr. Bond will make his headquarters in Milwaukee, he will cover Washington and key production centers throughout the United States. His address is Oakite Products, Inc., 757 N. Broadway, Milwaukee, Wisconsin.

Sherwin-Williams Adopts Returnable Drums Policy

To conserve supplies of steel, the Sherwin-Williams Company, 101 Prospect Ave., N. W., Cleveland, Ohio, announces that effective immediately, returnable steel drums will be used on all shipments of industrial finishes, solvents, and so on, instead of the single-trip containers formerly used. This change is in keeping with the company's policy of simplifying its entire packaging set-up in an attempt to save metal for war production, and many intermediate sizes have been eliminated from the company's consumer line. The industrial division executives feel sure the company's customers will cooperate in this wartime conservation project, despite the extra bookkeeping and handling work involved.

George B. Beitzel Appointed Vice-President Pennsylvania Salt Manufacturing Company

The Pennsylvania Salt Manufacturing Co., 1000 Widener Bldg., Philadelphia, Pa., announces the promotion of George B. Beitzel from manager of sales to vice-president in charge of sales. Mr. Beitzel's elevation to this important position will be of interest to users of



George B. Beitzel

metal cleaning compounds of the type manufactured by his company. Primarily a manufacturer of products deriving from salt, the company, about seven years ago, decided to develop its sub-

silicate products for use in metal cleaning. Mr. Beitzel has been largely instrumental in the promotion of the company's cleaning products to their present position of importance both in the industry and in the company's business.

George Beitzel's career is an example of the success which can come from hard work and steady and unflagging perseverance. He was educated in the public schools of Philadelphia and in the University of Pennsylvania. He served his country in the First World War, advancing through the ranks from private to first lieutenant. After the war he spent a number of years with John T. Lewis & Bros. Company, paint manufacturer, and 12 years ago came to the Pennsylvania Salt Manufacturing Company.

Robert V. Finch to Represent Cowles in Northeastern Ohio

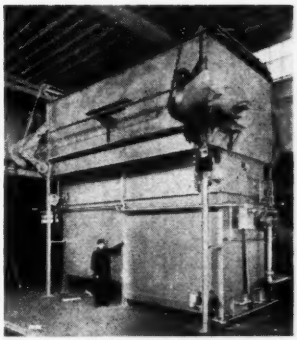
Robert V. Finch is the new Cowles Detergent Company representative in Northeastern Ohio and Northwestern Pennsylvania. He will handle Cowles' complete line of alkaline metal cleaners and wire drawing lubricants.

"Bob" has had many years experience in the Cowles organization, beginning in the laundry sales department and later as assistant sales manager of Cowles' Heavy Chemical Department which was organized to introduce and promote the use of Cowles Drymet, the original anhydrous sodium metasilicate. Since the beginning of the National Defense Program, he has been devoting most of his time to metal cleaner sales and service.

Robert V. Finch

BLAKESLEE *is the Name*

Blakeslee is the pioneer name in parts washing and degreasing machines that you hear everywhere today in all phases of defense government production . . . Blakeslee is the name that means top speed in removing oil, chips, drawing compounds, from all metal parts and therefore means, speed in finishing, machining and inspection operations . . . Blakeslee is the name of the "Engineered-for-your washing and degreasing machines." Write or wire for rush proposals or consultation with Blakeslee engineers, no obligation on your part.

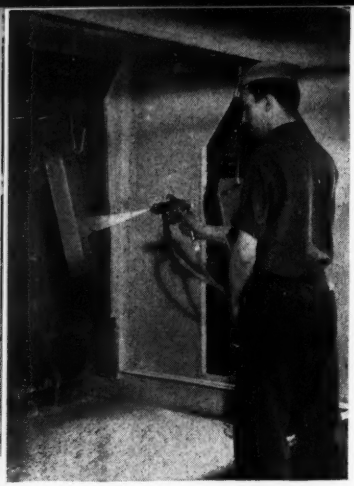


Conveyorized degreaser for cleaning fifteen foot aluminum sheets.

G. S. BLAKESLEE & CO.

Cicero Station

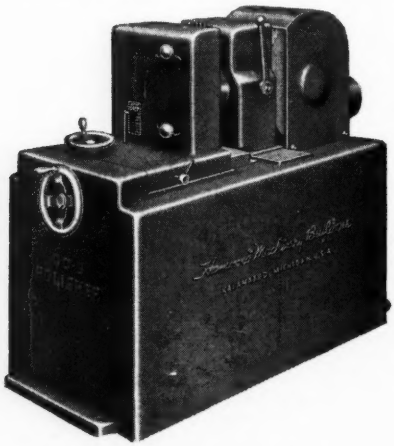
NEW YORK CHICAGO TORONTO, ONT.



New PLANT EQUIPMENT AND Materials

Hammond "OD" Cylindrical Polisher

Hammond Machinery Builders, Inc., 1622 Douglas Ave., Kalamazoo, Mich., announces the development of a new "OD" Cylindrical Polishing Machine capable of handling ¼ in. to 9 in. outside diameter cylindrical shapes, rods, and tubes; especially adaptable to the use of abrasive belts with back stand attachments, polishing or buffing wheels.



Hammond "OD" Cylindrical Polisher

The range of feed of this machine is said to be 0 to 50 ft. per minute, forward or reverse. One of the features claimed is that the machine is designed to permit an inexperienced operator to secure quality finishes at high production rates.

The Hammond "OD" Polisher is a substantial, sturdy machine using for the polishing members various types of wheels and abrasive belts required in finishing the work on the machine. The wheel head mounting is heavy and rugged with a large spindle running in precision ball bearings properly lubricated with oil and sealed to prevent ingress of dust and dirt. A slide provides quick adjustment of the patented cushion polishing wheel which has a 6 in. face by 12 in. to 16 in. diameter.

The Vari-Matic feed is motor driven through a variable speed drive, allowing various speeds of rotation of work as well as feed. A quick release lever enables the operator to control the work being fed through the machine by disengaging the work from the face of the wheel.

The work support is adjustable to the wheel by quick and simple means for work of varying diameters. The particular style or type of work support is either the company's standard, or specially built for the customer's requirements. All parts are carefully guarded and readily accessible. The wheel cover can be quickly removed for changing wheels and abrasive belt.

Newcomb-David Uni-Wash Dust Collector

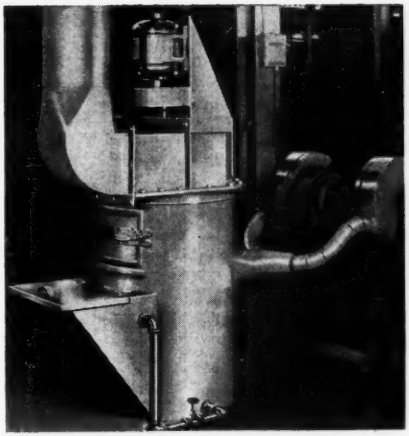
A water-type dust collector has been introduced by the Newcomb-David Co., 5741 Russell St., Detroit, Mich. The

unit, which is known as the Newcomb-David Uni-Wash Dust Collector, is designed to efficiently remove dirt, dust, lint, grindings, fumes, and vapors from the air. It is said to be particularly adaptable to grinding and polishing operations. The unit can also be used in ventilating explosive ducts and hazardous operations in the finishing of magnesium alloys.

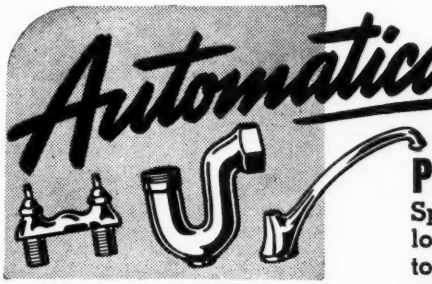
The Uni-Wash Collector occupies a minimum of floor space and is solidly built of welded steel. All bearings are of the ball bearing cartridge type. The bearings are ring sealed with Zerk lubricating fittings and, like the shafts and other parts, are standard, thereby making any necessary replacement easy and inexpensive.

As shown in the accompanying illustration, the dust collector requires only one motor—a feature which contributes to low operating costs. In addition, the unit is designed to eliminate the need for a continuous flow of water. According to the manufacturer, it is seldom necessary to add water to the original supply except when the sludge tank is periodically drained for cleaning.

In the operation of the Newcomb-David Uni-Wash Dust Collector, the air enters through an inlet pipe which can be located in the back or on either side, depending on the selection of the most practical location for the dust collector in relation to the equipment to which it



Newcomb-David Uni-Wash Dust Collector



POLISHED and BUFFED

Speed-up production — save time — lower your costs. The National Victory Program demands action for a successful conclusion. PACKER-MATIC plays its part.

Write for literature.

•AUTOMATIC POLISHING & BUFFING MACHINES

Packer-Matic

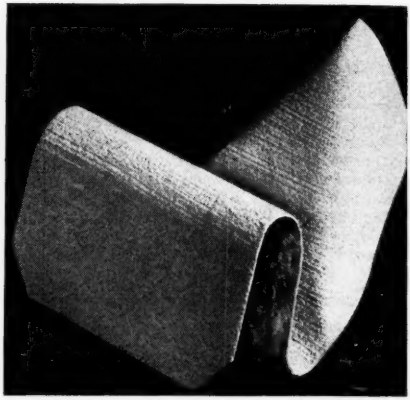
THE PACKER MACHINE CO., MERIDEN, CONN., U. S. A.

is attached. As the air enters the unit, a powerful exhaust fan draws it, in combination with a spray from the water in the tank below, through a circular suction cone. Directly above the cone is a revolving screen moisture eliminator which separates the water from the air. The air then passes through the exhaust fan and into the air outlet. Under average conditions, the cleaned air may be returned to the working area.

The dirt removed from the air is deposited in the sludge tank. The sludge is easily removed, even when the dust collector is in operation, through a sludge removal compartment on the front of the unit.

Wet-X-Hale

A material to be known as Wet-X-Hale Builders' Plastic which is said to protect and preserve metal surfaces has been placed on the market by Rogear Company, 11 Water St., New York, N. Y. According to the manufacturer, fully rusted steel surfaces can be protected without the removal of rust and without using any primer.



Panel showing brush finish of Wet-X-Hale Builders' Plastic on galvanized steel.

Wet-X-Hale Builders' Plastic is said to provide a seal tight coating which will not permit penetration or damage through severe weather conditions. Wet-X-Hale Builders' Plastic is an oil base Portland Cement product, combined

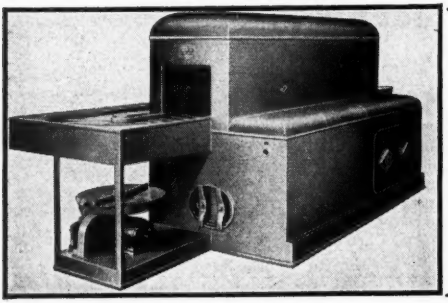
THE ADIRONDACKS GORE MOUNTAIN CRYSTAL GARNET ORE

ABRASIVE GARNET

For
Abrasive Paper and Cloth
Grinding Wheels
Sand Blast
Minus 300 Mesh for
Polishing and Lapping
Grades for Barrel Finishing

Ample Stocks Insure Prompt Shipment

BARTON MINES CORPORATION
NORTH CREEK, WARREN COUNTY, N. Y.



HYDRO-FLOW
Industrial Washing Machines

Streamlined design. Hidden motors, pumps and pipes are easily assembled. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles—from mist to open stream. Monorail, Belt or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.

International Conveyor & Washer Corp.
Write for circular.
640 E. FORT ST. DETROIT, MICH.

with various fine aggregates so ratioed and processed to provide a smooth working plastic medium which produces a firm, tough yet flexible finish. It can be used on both interior and exterior surfaces and is available in pastel and dark shades and also in white.

The material can be applied by brush, by spray gun, or trowel. It is recommended for use on hangars, tanks, towers, bridges, roofs, and so on. The application of Wet-X-Hale is said to require no special primer.

Tulca Safety Lenses for Women Workers

Today's total warfare and the mobilization of woman power as well as man power, has placed greater emphasis on the need for eye protection.

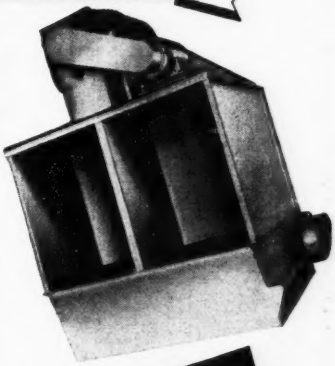
Safety Directors, who are more than ever aware of the need of eye protection for both men and women workers, are said to be rapidly adopting the new-type rimless safety spectacle equipped with Tulca lenses which are manufactured by Tulca Division, The Univis Lens Company, Dayton, Ohio. They are available with or without side shields, which are removable. These new-type lenses, which are made of a special new material (not glass) are said to be arousing widespread comment, because

Tulca Safety Lenses for Women Workers

THE VITAL UNIT IN AIR DEFENSE

Processing of Magnesium Can Now Be Done Safely

The New Hydro-Whirl Makes This Possible



At last the hazards attending the processing of magnesium have been removed. The development of the Hydro-Whirl principle of dust control opens the way to increased use of magnesium—a metal generally avoided because of its dangerous characteristics.

The Hydro-Whirl is a wet dust collector adaptable to many purposes—for either flexible shaft or stand grinding. Every industry—particularly the airplane industry—welcomes this new equipment because it meets a vital need at this time. It increases the measure of safety and broadens the possibilities of greater production.

The showing of such high efficiency on magnesium proves that it can perform with equal success with other dusts such as aluminum, iron, steel, etc.

Discuss your dust problems with our engineers

630 E. Forest Ave. - Detroit, Mich.

Industrial SHEET METAL WORKS

Manufacturers of Hydro-Whirl Dust Collectors and Spray Booths, Ovens, Mechanical Washers and Industrial Ventilation Systems.

of their comfort and lightweight. It is interesting to note that Tulca lenses weigh only one-half as much as glass safety lenses.

This lighter-weight factor is regarded as news in the eye safety field, because it overcomes the tendency to remove the heavier type of goggle, and because it thus offers continual eye protection throughout the day.

It is this new appreciation of the necessity for eye protection that is resulting in workers engaged in light assembly operations such as supervisors, checkers, inspectors, maintenance workers, voluntarily wearing these lighter-weight, more comfortable lenses all day long. It is interesting to note that many plants, today, insist that Tulca safety lenses be worn, either with or without side shields, by all persons who visit the plant.

Gunk

A cold process of metal cleaning in which a compound known as Gunk X-11 is used has been placed on the market by the Curran Corporation, 6 Pleasant St., Malden, Mass. Gunk X-11 is said to be a new mineral grease and dirt digestive solvent. It is available in the form of a concentrate which may be diluted with a grease solvent before use to charge large open cleaning tanks or vats.

Gunk X-11 is said to be particularly applicable for use where there is much insoluble dirt or smut to be removed.

The cleaning method prescribed for use with Gunk X-11 may be carried out by cold immersion of greasy or dirty parts. The solvent, it is said, not only takes the cling out of hard mineral dirt and grease accretion, but emulsifies them as well, so that they may be instantly and completely rinsed away by sluicing with a water hose. This process of cleaning is said to make possible grease cleaning operations on a large scale with little investment in material. Only simple rectangular tanks of suitable dimensions, and having over-all capacities of at least 300 gal. are necessary.

Drum of Gunk X-11

Paasche Automatic Shell Painting Unit

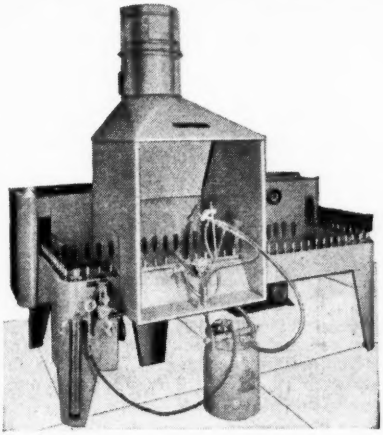
Speeding the flow of ordnance to our armed forces is a new type automatic unit for painting the exteriors of 20 mm.

UNIFORM DEPOSITS, BETTER FINISHES — USE HARSHAW ANODES *AND* CHEMICALS

THE HARSHAW CHEMICAL COMPANY

Cleveland, Ohio and Principal Cities

shells. This Paasche Automatic Shell Painting Unit has been placed on the market by Paasche Airbrush Company,



Paasche Automatic Shell Painting Unit

1910 Diversey Pkwy., Chicago, Ill. Average production is 1,800 pieces per hour, painted and dried. Larger units for greater production are also being manufactured and units similar to that illustrated are made for painting 37 and 40 mm. shells of various types.

In the operation of this machine, the 20 mm. shells are loaded manually and conveyed to the spraying station on removable holding and shielding fixtures. Special off and on control operates the automatic airbrushes as shells come into position. While being sprayed, shells are revolved rapidly to insure perfect and complete coverage. After shells receive the coat of lacquer they are conveyed through an electrically heated, thermostatically controlled oven for a three-minute drying period.

The unit includes a spray booth with exhaust, electrically heated drying oven, "clamptight cover" material pressure tank, water, oil and dirt separator to provide clean, dry air and automatic airbrushes with off and on control.

Alkalume

An aluminum cleaning compound to be known as Alkalume has been placed on the market by Northwest Chemical Co., 6529 Russell St., Detroit, Mich. Oil, grease, drawing compounds, and polishing materials are said to be removed quickly and safely from aluminum surfaces by means of Alkalume. This material is supplied in powdered form. When mixed with water, the powdered Alkalume dissolves freely and the recommended proportion is to 12 oz. of Alkalume for each gallon of water. The recommended operating temperature is 170 to 212 deg. F.

According to the manufacturer, Alkalume does not attack aluminum surfaces and leaves no deposit upon the cleaned surface. The material is available in 450-lb. kegs.

RECOVERED TALLOW

An excellent Tallow reclaimed from Harness Leather. This product is unusually high in heat resistance, due to the absorption of the natural chemical properties contained in harness leather.

Write for samples and quotations.

M. ROSS MASSON COMPANY
Dept. P.F.
2160 Montcalm St., Indianapolis, Ind.

CUT DOWN REJECTS WITH ORVUS IN YOUR METAL CLEANING BATHS

This sulfated fatty alcohol Cleansing Agent is EFFECTIVE
—as a surface tension lowering agent
—as an emulsifier
—in dispersing lime soaps which might cause poor plating results if permitted to deposit on the metal

Write for further information about Orvus to

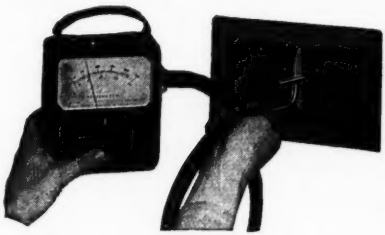
PROCTER & GAMBLE, Cincinnati, Ohio

Air Intake or Exhaust Grille Jet for "Alnor" Velometer

Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago, Ill., is now offering an air intake or exhaust grille jet designed for use with its "Alnor" Velometer (air velocity meter). The jet has two calibrated air intake openings. One of the openings is at the end of the main member. This member forms a compensating tube and extends from the grille face outward from or beyond the critical suction zone; that is, the zone where the air pressure changes most rapidly from static to velocity.

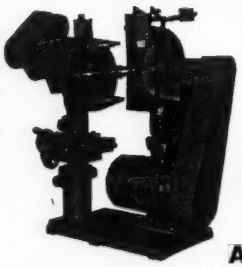
At right angles to the main member is a branch tube, also calibrated, to which is attached the flexible tube connecting the jet to the Velometer. The air actuating the Velometer movement is inspirated through the branch tube by the force of the suction exerted upon the main member or compensating tube.

The jet is offered in two sizes—low velocity of ⅝-inch O.D. tubing for full scale ranges of 0 to 1,000 f.p.m., and high velocity of ⅜-inch O.D. tubing for scale ranges of 0 to 2,500 feet per minute and higher.



Air Intake or Exhaust Grille Jet in Use with "Alnor" Velometer

Get Hep to This for Polishing and Buffing! Faster and Cheaper



ACME SEMI-AUTOMATIC and Lathe Combination Unit

One of the many Acme Automatics designed to speed up production and reduce production costs. Send sample for free production estimate.

ACME Manufacturing Co.
1642 HOWARD ST. • DETROIT, MICH.
Builders of AUTOMATIC POLISHING AND BUFFING MACHINES FOR OVER 25 YEARS

Black-Magic Die Cast Black

A positive, fast-working, cold process for coloring zinc base die castings a rich attractive black color to be known as Black-Magic Die Cast Black is now being marketed by The Mitchell-Bradford Chemical Co., Seymour St. off Bruce Ave., Bridgeport, Connecticut.

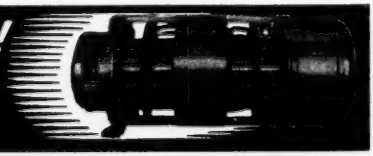
Black-Magic Die Cast Black is a ready to use material which can be maintained in a stone jar or crock. To use, the workpieces are immersed in the solution from 5 to 15 minutes. According to the manufacturer, the solution reacts with the surface and slightly hardens it. Oxidation of the surface is inhibited and it is said to provide a good bond for lacquer, paint, or enamel.

Black-Magic Die Cast Black is available ready mixed in 13-gal. carboys.

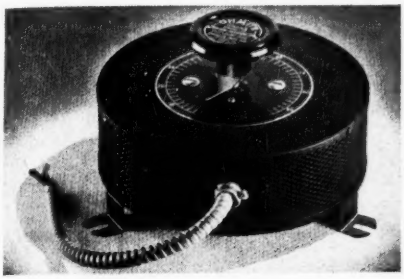
Ohmite Rheostat Cages

A variety of rheostat cages have been developed by the Ohmite Manufacturing Company, 4835 Flournoy St., Dept. 2H, Chicago, Ill., for us with

BETTER PLATING, LESS COST!
"MGC" ELECTROPLATING EQUIPMENT
Write for Interesting Details TODAY!
MOTOR GENERATOR CORP., HOBART SQ. TROY, OHIO



Ohmite Rheostats. A cage enclosure is a convenient form of table top or surface mounting and is advisable where



Ohmite Rheostat Cage

there is possibility of mechanical injury to the rheostat or human contact with electrically "live" parts. Surface mounting cages are widely used in connection with fractional h.p. motor controls; heating device controls; on dental and medical equipment; and for use in laboratories.

Ventilated cages with perforated sides are most generally applicable. Other types available are: dustproof cages, cages to house rheostats in tandem, explosion proof cages, ventilated cages with one-half closed as a splash guard, and a laboratory type semi-enclosed table-top cage. Various types of terminals can be supplied.

Eclipse Aviation Seamless Flexible Metal Hose

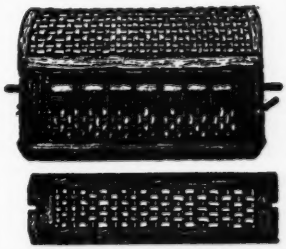
A flexible metal hose of greatly improved seamless corrugated construction has been made available by the Eclipse Aviation Division of the Bendix Aviation Corp., Philadelphia, Pa. The hose, which is available in a large variety of special alloys, is said to be practically indispensable in the building of modern transport, fighter, and bomber airplanes, tanks, submarines, and so on, as well as in various industrial applications.

The flexibility of the hose is derived from the movement in the side walls of each corrugation. The greater the number of side walls the greater the degree of flexibility. The flexibility is said to be further increased by the uniform metal in the corrugations as well as by the large outside diameter as compared with the inside diameter of the hose. The small radii to which the hose may be bent is evidence of its flexibility. However, the hose cannot be straightened out to its original form and bent again repeatedly without stressing the metal beyond its elastic limit.

Pangborn Airless Rotoblast Cabinet

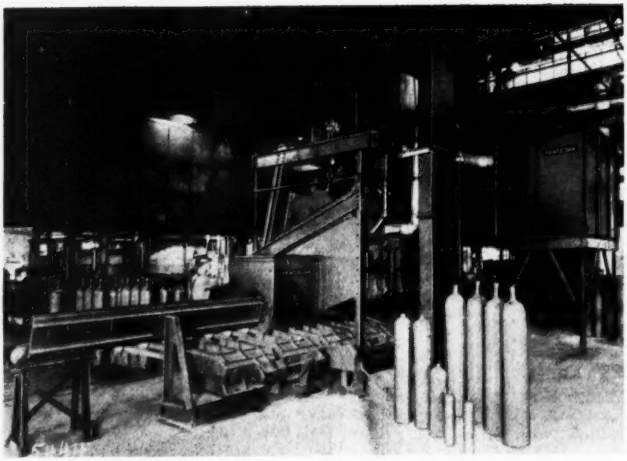
The Pangborn Corporation, Hagerstown, Md., has placed on the market an Airless Rotoblast Cabinet for use in removing scale from oxygen and gas

IN TIMES OF NEED
INVESTIGATE
K I N G



PLATING BARRELS
SIZES FOR ANY EQUIPMENT
Write for illustrated folder.
Use them once—you'll use them always
JOHN KING
48 SPRINGFIELD ST. DAYTON, OHIO

For a real good polishing job use
KEYSTONE EMERY
TURKISH — NAXOS — AMERICAN
KEYSTONE EMERY MILLS Write for Sample 4316 Paul St., Phila., Pa.



Pangborn Airless Rotoblast Cabinet

cylinders. The resulting finish from use of this equipment is a bright smooth surface.

The Pangborn Airless Rotoblast Cabinet employs an entirely automatic system of conveying work through the blast stream. The production for this unit is 450 large cylinders per hour.

"Ply-Rustex" Rust Prevention Cream

The Milburn Co., Detroit, Mich., is now marketing a rust prevention material in the form of a cream which can be applied to the hands of a workman before contact with highly polished metal surfaces. The material, which is known as "Ply-Rustex," is designed to eliminate perspiration corrosion and other forms of rusting caused by the handling of metals during machining and processing operations.

With Ply-Rustex, the worker applies the cream to his hands before touching any part of the article to be machined or processed. This enables the worker to freely handle the metal part throughout the machining operation without gloves, since Ply-Rustex forms an invisible film on the skin which is said to be inert with respect to chemicals, oils, cutting compounds, and other materials that may be a part of the particular industrial process.

According to the manufacturer, Ply-Rustex is non-toxic and positively harmless to the skin. It can be easily applied similar to a vanishing cream and removed with equal facility. Moreover, since it forms an impervious protective coating, the material is said to prevent irritations that may result in many forms of industrial skin disorders or dermatoses.

Sureseal Plastic Gloves

Safeguarding productive hands in all types of defense work has become increasingly vital. So that serious hand injuries from caustics, acids, solvents, oils, and so on, can be kept at a mini-

DECREASE DEGREASING COSTS!

We can build a "D'OILER" (manual or automatic) to handle your degreasing jobs swiftly and economically. May we send you complete details?

MECHANICAL PROCESS CO.

Specialists in the use and handling of chlorinated solvents

SOUTH ORANGE • NEW JERSEY

mum, The Surety Rubber Co., Carrollton, Ohio, has introduced the new exclusive Sureseal Industrial Glove line.

Sureseal Gloves are produced from a

Sureseal Plastic Gloves

new synthetic plastic material that has sufficient elasticity to give ample flexibility and comfortable finger freedom. The transparent material is also applied as a bonded coating to various styles of fabric and leather work-gloves in the Sureseal line and is available in Sureseal aprons and fingercots.

The material is inert, non-toxic, odorless and tasteless. Aging, sunlight, ultra-violet light, acids, alkalies, alcohols, ketones, esters, aromatic hydrocarbons, aliphatic hydrocarbons and mineral, animal and vegetable oils that usually attack and destroy natural rubber and other substitute materials are said to have little or no effect on Sureseal gloves. Resistance to abrasion and tearing is particularly good in comparison tests, according to the manufacturer.

Hilo Black-Out Paint

Hilo Black-Out Paint now being manufactured by Hilo Varnish Corporation, 42 Stewart Ave., Brooklyn, N. Y., is said to conform to the specifications of the Camouflage Committee of the National Paint & Varnish Association for Type I.

This product is said to be waterproof, may be used for inside or outside, and blacks out fluorescent and other lights. It flows out to a smooth, even, dull finish, giving complete black out in one coat and is said to resist heat up to 212 deg. F. Hilo Black-Out Paint hides approximately 500 sq. ft. to the gallon, more or less, according to the smoothness of the glass. It dries to touch in 15 minutes, is hard in two hours, and can be removed with kerosene or other mineral solvents. Hilo Black-Out Paint should be applied in a full, even coat. It may be brushed or sprayed as it comes in the can.

For complete black out and elimination of all glare and reflections from smooth glass, the Camouflage Department recommends that these surfaces should be painted on the outside.

INDUSTRIAL CHEMICAL PRODUCTS CO.

Engineered Products and Processes For Preparing Metal For Painting

DETROIT

Chicago • **Ft. Wayne**

"MAGIC" TACK RAGS IMPROVE YOUR FINISH 100%

MAGIC TACK RAGS remove specks, lint and sand particles--- bring out that deep, smooth luster, produce a faultless surface for white or colored finish. Why use "home made" tack rags when you can buy MAGIC TACK RAGS at trifling cost! They are tackier, do not dry--- are dust-proof and spontaneous combustion proof. Packed in dozen and gross lots or more. Made only by the

Wm. A. Juergens Co.
4036-40 Lagrange Street,
Toledo, Ohio, U. S. A.

If your dealer does not carry Magic Tack Rags, write us for sample.

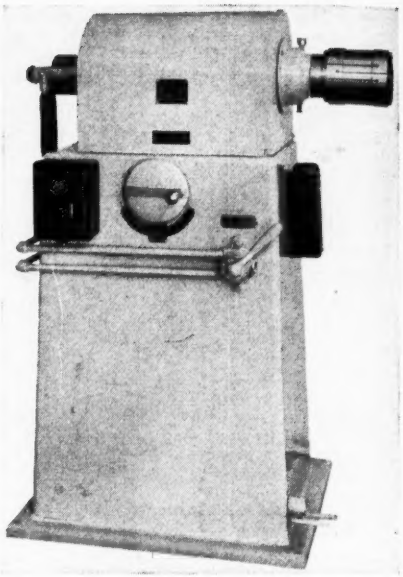
"Flash-Stone" High Speed Floor Resurfacing Material

A high speed floor resurfacing and repairing material for industrial plants, to be known as "Flash-Stone," has been placed on the market by L-L Inc., 576 Fifth Ave., New York, N. Y. Features claimed for the material include immediate usability of repaired or resurfaced floor areas, simplicity of application, and long life.

Schauer Variable Speed Lathe

Designed especially for polishing and finishing engine barrels on aircraft engines, the variable speed lathe shown in the illustration has been brought out by the Schauer Machine Co., 2060 Reading Rd., Cincinnati, Ohio. The lathe is equipped with an expanding mandrel for holding the work. The mandrel is air operated and is controlled by means of a hand air valve which, if desirable, can be replaced by a foot control.

Any spindle speed desired—from a low of 105 r.p.m. to a high of 1,155 r.p.m.—can be obtained while the lathe is in operation. The machine is equipped with a two-speed, 1-2 h.p., 875-1,750 r.p.m. standard N.E.M.A. frame motor. The machine is also provided with an automatic brake which is applied when the foot treadle of the machine is depressed to open the motor circuit.



Schauer Variable Speed Lathe

The Schauer Variable Speed Lathe can be supplied with single or two speed motor, permitting infinite selection of spindle speeds between 25 and 4,000 r.p.m. in a ratio of 5½ to 1 with a single speed motor and 11 to 1 with a two-speed motor. The machine can also be supplied with a three or four-jaw chuck or special holding device to meet individual requirements.

RUST-I-CIDE "50"

CLEANS METAL Easily and Quickly

REMOVES RUST

. . . and provides a foundation for good, lasting finishes.

RUST-I-CIDE "50"

★ Imparts better adhesion by mildly etching.

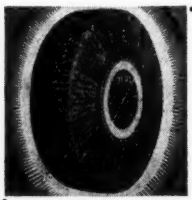
★ Gives longer life by preventing rusting from within.

★ Chemically cleans—dissolves and *removes* common shop accumulations.

★ Instantaneous action and low cost.

That's why so many companies working on defense orders are using RUST-I-CIDE

RUSTICIDE PRODUCTS COMPANY
Cleveland, Ohio



POLISHING GRINDING WHEELS

Made of
WOOL — COTTON
LEATHER — CANVAS

EFFICIENT • LOW COST • PROMPT DELIVERY

ARROW DURA WHEEL, INC.
60 Grand Street New York City

Andelco Black-Out Shade Equipment

Andel and Company, Inc., 5218 N. Kedzie Ave., Chicago, Ill., has placed on the market a line of black-out shade

Andelco Black-Out Shade

equipment to be known as Andelco. This type of equipment was created and introduced to fill definite demands of Army, Navy, and Air Corps blacking out requirements, as well as that of war and defense production industries and business or commercial establishments subject to black-out orders.

According to the manufacturer, no matter how many foot-candles of illumination are present on the interior of any building, Andelco Black-Out Shades provided over the window will black it out absolutely.

Andelco Black-Out Shades are retained in vertical channels against wind and high explosive or bomb concussions by means of milled bronze balls clamped to the edges of the shades. Worm and worm wheel tension adjusters to permit easy adjustment of spring roller tension as well as thrust ball bearings to assure smooth easy operation are provided as standard components. The black-out shade box and the channels are made of No. 20 gauge electro-galvanized steel. The standard finish is black wrinkle. The pull cords are of pure linen braided traverse cord and can be locked positively against concussion or other disturbance by means of an eccentric lock cord.

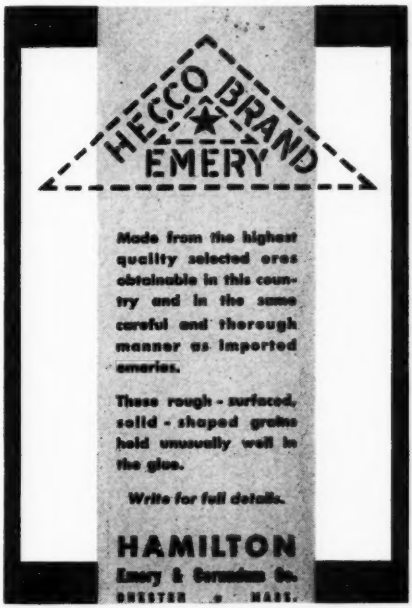
Black-Magic Hi-heat Finish

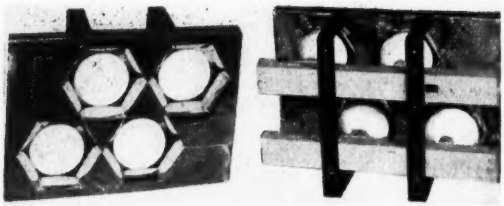
A finish to be known as Black-Magic Hi-heat for cast iron, malleable iron, brass and copper has been placed on the market by The Mitchell-Bradford Chemical Co., Seymour St. off Bruce Ave., Bridgeport, Conn. Black-Magic Hi-heat is applied from a molten bath which is operated at 950 deg. F. An immersion of workpieces from one to ten minutes to produce a rich blue black is recommended.

The finish provided by Black-Magic Hi-heat is said to be permanent and also to provide a permanent bond for lacquer, paint, or enamel.

Miskella Infra-Red Insulated Reflective Panel

Insulated reflective infra-red panels are now being marketed by Infra-Red, 1633 E. 40th St., Cleveland, Ohio. The panels are available in 10 standard sizes: 8 in. by 15 in. by lengths varying from 17 in. to 51 in. The 17 in. panels accommodate three lamps and the 51 in. panels accommodate 12 lamps.


HECCO BRAND
EMERY
Made from the highest quality selected ores obtainable in this country and in the same careful and thorough manner as imported emories.
These rough-surfaced, solid-shaped grains hold unusually well in the glue.
Write for full details.
HAMILTON



Miskella Insulated Infra-Red Reflective Panel

The Infra-Red Insulated Reflective Panel is 1½ in. thick and the available finishes are aluminum, chromium, and gold.

Any single panel, whether used alone or as a part of an Infra-Red oven installation, is said to be quickly removable and replaceable. By means of adjustable suspension brackets, the insulated panel units can be mounted side by side, end to end, or face to face, and in many other positions. The panels are insulated with fiberglass.

Valdura No-Odor Paint

A newly improved paint, designed for use in plants where odors from conventional paints are offensive to workers, has been announced by American-Marietta Co., 43 E. Ohio St., Chicago, Ill. Not perfumed but actually deodorized before being canned, it makes possible painting in winter or summer without discomfort. Windows may be kept closed while the paint is being applied. The produce sets in three hours, and is completely dry in 12 to 15 hours.

Designated as Valdura No-Odor paint, it may be used on plaster, wall board, wood, cement, brick or metal, and is available in flat, egg-shell and gloss finishes. Coverage is 700 square feet to the gallon, with hiding power that makes possible one-coat jobs in many applications. Of heavy consistency, ease of brushing speeds application 10 to 25 per cent above conventional wall paints. It may be applied with a spray gun when cut with one pint of the proper thinner to one gallon of paint. Flat and egg-shell finishes may be stippled.

All finishes are washable, and colors are designed not to fade or dull with repeated washings. High reflectivity reduces light requirements. Colors available are white, cream, ivory, buff, grey, blue and green.

1-9-4-?

Some year the war will end.
Swords will be beaten back into plowshares, and golf clubs and refrigerators.
There will be a swing back into the things we buy because we like them and not because they are a grim necessity.
You are planning these things now, or should be.
Let us plan with you toward the finish for 194?, whenever it is.
We welcome any call for co-operation on long-range planning for the finish of the future.
Meantime, for 1942 and as far as we can see, we shall do our utmost to supply our customers with the best available materials and service permitted by wartime conditions.

The Varnish Products Co.
5208 Harvard Ave. Cleveland, Ohio

Walker-Turner Foot-Operated Speed Lathe

Adaptable to handling many jobs now being done on conventional lathes or similar machines, the foot-operated speed lathe illustrated herewith has been placed on the market by the Walker-Turner Co., Inc., 7111 Berckman St., Plainfield, N. J. The lathe is designed for use in polishing, burring, and lapping ferrous and non-ferrous metals and plastics, and will chuck rounds, tubing, and hexagonal shapes up to 2 in. in diameter. According to the manufacturer, the lathe is now being used extensively in the aviation industry to polish engine parts such as valves, push rods, bolts, and like parts at a great saving in time and material.

The Walker-Turner Speed Lathe is equipped with a three phase motor in direct drive or can be obtained with a gear-driven type motor. A foot pedal controls the motor switch and a synchronized brake, which brings the spindle to an instant stop when motor

Walker-Turner Foot-Operated Speed Lathe

circuit is broken. The brake holds the spindle stationary while work in the chuck is being changed.

Available with either a Jacobs chuck of ½ or ¾-in. capacity or a 4-in. three-jaw universal lathe chuck, the Walker-Turner Foot-Operated Speed Lathe has a speed range from 950 to 7,200 r.p.m. The unit is also available with a two-speed motor. Over-all height of the lathe is 42 in. and weights, depending on motor, are up to 300 pounds.

"Ruscat"

A rust-proofing and metal cleaning solution to be known as "Ruscat" has been developed by the Research Laboratories of The United States Stoneware Co., Akron, Ohio. The principal use for this material is in cleaning and preparation of metal surfaces before the application of corrosion resistant paints and coatings and also for the purpose of preventing further rust formation.

"Ruscat" is said to produce a mild etch on metal surfaces, resulting in the formation of a chemically adherent inorganic base over which lacquers and other coatings may be applied. The chemically adherent inorganic base is said to provide maximum adhesion for all types of finishing material. A thorough chemical cleaning of the minute pores of the metal is said to be achieved in addition to the removal of all surface contamination, scale, and rust.

Ruscat may be applied by brushing or dipping. After a few minutes, the solution may be wiped off and the surface permitted to dry. Another use for Ruscat is to facilitate the handling of iron and steel after long exposure, storage, and handling, prior to use for fabrication, and so on.

Westinghouse Type FPS-40 "High-Vision" Fluorescent Luminaire

To speed up production in industrial plants where extended light lines are desirable, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has placed on the market the Type FPS-40 "High

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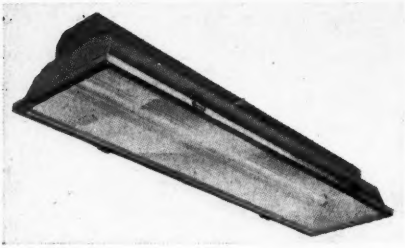

Westinghouse Type FPS-40 "High Vision" Fluorescent Luminaire

Vision" Fluorescent Luminaire shown herewith. The luminaire employs two or three 40-watt fluorescent lamps per reflector and is designed to provide lighting intensities of from 30 to 100 footcandles with maximum diffusion, minimum glare, and uniform distribution at ordinary spacing and mounting heights. The unit provides adequate visibility for close work such as reading precision micrometers, verniers, and other shop instruments.

The design of the luminaire makes it possible to construct any length of strip desired from four simple and compact types. Channels provide a continuous wireway which may be mounted on conduit, messenger cable, twin-rod suspension, or directly on the ceiling. All auxiliary equipment is mounted in the channel. The units have twin-ballasts with built-in compensators providing power factor of 90 per cent or over.

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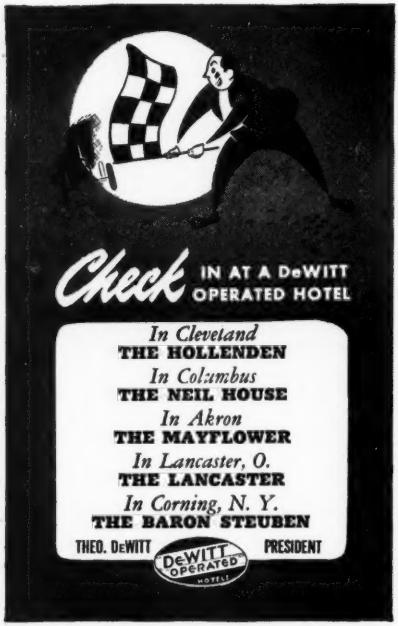

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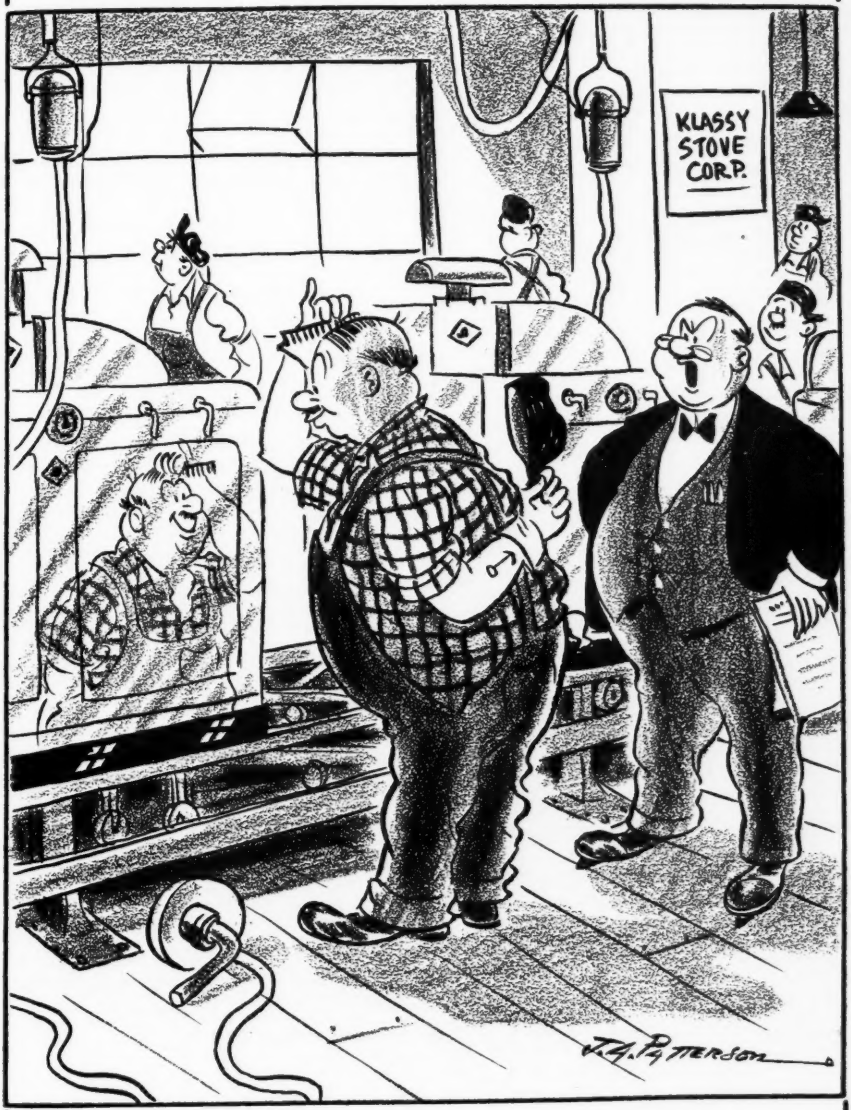

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To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Automatic Painting Equipment

Automatic units and special equipment for air-painting shells, bombs, land mines, fuse parts, and miscellaneous items are described in Bulletin F12-41 now being issued by Paasche Airbrush Company, 1910 Diversey Pkwy., Chicago, Illinois.

2. Steam Traps

Float-Thermostatic steam traps, compressed air traps, and liquid level controls are described in Bulletin No. 450 which is now being published by Sarco Company, Inc., 475 Fifth Ave., New York, New York.

3. Clean Air Is On the Priority List

A very interesting folder which emphasizes the necessity for clean air in manufacturing plants is now being issued by the American Air Filter Co., Inc., 224 Central Ave., Louisville, Kentucky.

4. Burring With the Lea Method

An eight-page bulletin covering the Lea method of burring is now being distributed by Lea Manufacturing Co., 22 Cherry St., Waterbury, Connecticut.

5. Black-Magic Products

Five Black-Magic metal finishes are described in a catalog which is now being distributed by The Mitchell-Bradford Chemical Co., Syemour St., off Bruce Ave., Bridgeport, Connecticut.

6. Polishing and Buffing Wheels

The advance line of polishing and buffing wheels for the metal-finishing industry is described in a 28-page illustrated catalog now being issued by Advance Polishing Wheels, Inc., 844 W. 49th Pl., Chicago, Illinois.

7. Industrial Styling with Color

A beautifully illustrated catalog depicting advertisements which have appeared in various magazines on Pittsburgh Industrial Finishes is now being issued by Pittsburgh Plate Glass Co., 2121 Grant Bldg., Pittsburgh, Pennsylvania.

8. Portable Cleaner

A portable cleaner designated as "3 in 1" for cleaning of dust, grit, filings, and turnings is described in a folder now being issued by Ideal Commutator Dresser Company, 1031 Park Ave., Sycamore, Illinois.

9. Bakelite C-9 Resins

Bakelite Resins designated as C-9 for the paint and varnish industry are described in a non-technical 12-page bulletin now being issued by Bakelite Corporation, 30 E. 42nd St., New York City.

10. Tools For Defense of America

A 46-page catalog describing a complete line of electric tools for defense industries is now being issued by Skilsaw, Inc., 4743 Winnemac Ave., Chicago, Illinois.

11. Corrosion Resistant Chemical Equipment

The Haveg Corporation, 34 Chapel St., Newark, Del., is now issuing an eight-page catalog completely describing its line of plastic chemical equipment.

12. Industrial Washing Machines and Conveyors

A folder telling how seven famous companies solved their product washing problems is now being issued by The Alvey - Ferguson Company, 75 Disney St., Cincinnati, Ohio.

13. Chromium Chemicals

The uses and technical properties of chromium chemicals are described in a booklet which is now being issued by Mutual Chemical Co. of America, 270 Madison Ave., New York City.

14. General Electric Immersion Heaters

Bulletin GEA-3195 now being issued by General Electric Company, Schenectady, N. Y., tells how to heat electroplating baths with General Electric Immersion Heaters.

15. Bakelite C-9 Resins

Bakelite Resins designated as C-9 for the paint and varnish industry are described in a non-technical 12-page bulletin now being issued by Bakelite Corporation, 30 E. 42nd St., New York City.

16. Hamond Variable Speed Lathe

A four-page folder illustrating and describing a method by which speed changes of 1,500 to 3,000 r.p.m. can be obtained instantly on the Hammond VRO Polishing and Buffing Lathe is now being issued by Hammond Machinery Builders, Inc., 1622 Douglas Ave., Kalamazoo, Michigan.

17. Du Pont High Speed Brass

The Electroplating Division of E. I. du Pont de Nemours & Company, Wilmington, Del., is now issuing a catalog on the rapid production of smooth, bright brass deposits.

18. Anodizing Aluminum by the Chromic Acid Process

The Mutual Chemical Co. of America, 270 Madison Ave., New York, N. Y., is now issuing a 24-page catalog describing the anodic treatment of aluminum.

19. Park Finishing Bulletin

A 4-page bulletin describing polishing, rubbing, and buffing compositions, and Kold Grip Grain Cement is now being issued by Park Chemical Company, 8074 Military Ave., Detroit, Michigan.

20. Metal Cleaning Tips

The chemical classification and selection of alkaline metal cleaners is contained in a bulletin which has been prepared and is now being distributed by the Cowles Detergent Company, 7016 Euclid Ave., Cleveland, Ohio.

21. Profits in Air

The manner in which electrostatic air filters help industrial plants eliminate losses resulting from contamination of products by dust, smoke, and fumes is described in a four-page folder which is now being issued by American Air Filter Co., Inc., 242 Central Ave., Louisville, Kentucky.

22. Heavy Duty Grinders and Buffers

The complete line of Marschke Heavy Duty Grinders and Buffers manufactured by Vonnegut Moulder Corporation, 1845 Madison Ave., Indianapolis, Ind., is illustrated and described in a 22-page catalog now being issued by the company.

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